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By F. G. Chandler, M.A., M.D. Camb., F.R.C.P.
PHYSICIAN TO ST. BARTHOLOMEW'S HOSPITAL, LONDON; SENIOR PHYSICIAN TO THE LONDON CHEST HOSPITAL

We are apt at times to congratulate ourselves on the decline in the incidence of tuberculosis; but still our sanatoria are overcrowded, the waiting-lists in many places are dangerously long, phthisis takes its dreadful toll in all classes, and it is but small satisfaction to those afflicted and to those who watch their sufferings, their hope deferred, their enforced inactivity perhaps for years, and the long and tedious treatment, and to us who know not only these but also the uncertain issue, to be told that tuberculosis is on the decline. On the great question of prevention, with its difficult social, legislative, and economic problems, and on the important subject of aftercare I do not propose to touch; the following remarks will be mostly restricted to certain aspects of diagnosis that, to my mind, appear still to need emphasis, and reiterated emphasis, and to the discussion of some methods of treatment.

What we can do at the present time to minimise the incidence of pulmonary tuberculosis is to endeavour to educate the public to desire and to insist on a pure milk-supply and to think bacteriologically, thus preventing the spread of bacilli. This involves care of cough, sputum, handkerchiefs, pillow slips, sheets and eating utensils. Not only the community but also many members of our profession have yet to realise the necessity for bacteriological investigation whenever there is persistent cough or phlegm. Pulmonary tuberculosis still masquerades sometimes as chronic bronchitis. The diagnosis is often not made early enough and is too often missed. Whatever may be said about nutrition, acquired immunity, and heredity, one fact stands out unchallenged—that is, that no-one, however ill nourished, or whatever the hereditary tendency, can contract the disease if he or she never comes into contact with the tubercle bacillus. Since this is difficult and expensive to achieve, though not impossible, attempts to produce immunity on a large scale have been made. Some have advocated small quantities of milk infected by bovine tubercle bacilli, others the ingestion of an attenuated culture of live human bacilli; but there are many who, rightly or wrongly, shrink from such methods, finding it difficult to believe that they are without risk. The proof of their efficacy, too, is not easy to establish.

DIAGNOSIS

The early diagnosis will be made by a careful consideration of the symptoms, by certain simple clinical methods, such as weight record, a temperature record taken especially at the usual time of maximal use—namely, 6.30 P.M.—by bacteriological tests and by radiography.

Symptoms.—Certain symptoms in conjunction may be almost pathognomonic; for example, cough, sputum, hæmoptysis, loss of weight, pain in the chest, and perhaps night sweats, but all of these may exist in other conditions. The symptoms, such as cough, sputum, or pain, may be localising in that they are referable to the chest but do not obviously suggest tuberculosis; or the symptoms may be neither pathognomonic nor localising in the slightest degree but simply those of vague ill health—namely, malaise, tiredness, loss of weight, indigestion, lack of appetite, disturbance of menstruation, anæmia, tachycardia, fainting, or fever. If a careful routine examination reveals nothing definite, tuberculosis should suggest itself as a possibility, and a full investigation should be made. "Weariness without cause indicates disease," and "Phthisis comes on mostly from eighteen to thirty-five years of age," wrote Hippocrates. The symptoms which should arouse suspicion but are often ignored or misinterpreted are cough, expectoration, slight hæmoptysis, and pleuritic pain. The cough is called "smoker's cough"; expectoration is ascribed to chronic bronchitis; slight hæmoptysis is explained away and not investigated and is said to come from the teeth, gums, nose, pharynx, or larynx; pleurisy is called idiopathic or sometimes rheumatism or intercostal neuralgia.

Physical signs.—Far too much reliance is still placed on physical signs in the diagnosis of pulmonary tuberculosis. In many affections of the chest signs are invaluable, but in pulmonary tuberculosis they cannot reveal an early lesion or a lesion separated from the chest wall by healthy lung tissue; nor can they tell us with any certainty the extent or distribution of the disease. A large cavity may exist with no demonstrable signs. Further, the physical signs of pulmonary tuberculosis can be imitated in every particular by other conditions. There is not a single pathognomonic sign of tuberculosis. This does not mean that the great value of physical signs is denied; they may lead to the diagnosis of tuberculosis, but only by correlation with the symptoms, history, and bacteriological findings.

Bacteriology.—Of all methods of diagnosis the bacteriological investigation is the most important; it is the one proof positive of the disease. The sputum must be tested even up to twelve times or more if necessary, though it is rare not to find the bacillus in the first few examinations in tuberculosis. If there appears to be no sputum, or if the patient cannot produce it, he must be encouraged with an expectorant. Another method is to place a laryngeal mirror at the back of the throat to excite a cough, and to examine the mucus or mucopus that appears on the mirror. If this gives a negative result, the fæces should be examined by the Antiformin method. Many women and children swallow all their expectoration, and bacilli may be found easily and in large numbers in the fæces in many cases. This has been tested numberless times at the London Chest Hospital and found to be of the greatest practical value; it is a far simpler procedure than the more advertised method of the stomach wash-out and is a more delicate test. In cases of doubt resort may be made to guineapig inoculation or to culture on Löwenstein's, Petragnani's, or other media. If tubercle bacilli are not found after careful search, the condition is almost certainly not tuberculous.

Radiography.—It is impossible to exaggerate the value of radiography. I would almost go so far as to say that often no final or useful opinion can be given without it. It is not so long ago that it was realised at chest hospitals that every case, without exception, had to be radiographed as a routine; otherwise many mistakes and omissions in diagnosis were made. The chest is so easily examined by X rays that advantage should more often be taken of this method. The relative importance of the various methods of diagnosis of diseases of the chest are, first, the symptoms and the history; secondly, microscopy of the sputum; thirdly, radiography; fourthly, exploratory puncture; and, lastly, the physical signs. These facts, it seems, are not yet sufficiently widely recognised in our profession. There still exists, in some places, the idea that with enough clinical skill radiography is not needed. I am convinced, however,

* The Mitchell lecture delivered before the Royal College of Physicians of London on Feb. 7, 1940.

that every expert in diseases of the chest throughout the world will agree with what I have said. If we do not use radiography often, we shall not only make errors but also miss a host of interesting conditions and fail to add our quota to the important research work that is taking place.

Some cases of phthisis are discovered by the cardiologist while screening the heart, the patient having been sent to him because of breathlessness or of tachycardia. Others are discovered by the radiologist after a barium meal or barium swallow, the patient having been sent to him because of indigestion and loss of weight. All manner of investigations are done except radiography. Why is this? The chief reason is that its value is not yet fully realised. But this is not the only reason. There still exists the physician who will disapprove of these remarks. He will say that it is dangerous teaching for the student, who must be taught to develop his senses. He may even regard it as a reflection on his skill; a similar attitude was adopted by many physicians towards the stethoscope in the early part of the nineteenth century. The number of die-hards, however, rapidly grows less; for, sooner or later, a chest reported normal by the self-confident physician will be shown by the X rays to be the seat of gross disease. Samuel Gee, over thirty years ago, as early as the 1907 edition of his classical "Auscultation and Percussion," writes in the preface:—

"No doubt the time has come when skiagraphy by X-rays should be reckoned among the methods of physical examination of the chest, yet inasmuch as few medical men possess the necessary apparatus, the topic has been excluded from the present book."

Today few practitioners are far removed from an X-ray plant, even in remote parts of the Empire. Samuel Gee would not fail to make use of this great advance, were he living now.

One still hears, only too often, expressions of surprise that the radiogram shows such extensive invasion of the lung when abnormal physical signs were practically absent. Not only does the radiogram show the type, distribution, and extent of the tuberculosis, but also it will demonstrate a tuberculous lesion in a very early stage. By it the progress of the case and the response of the lesion to treatment can be watched. Again, it may be the first proof of miliary dissemination. Of all methods for early diagnosis radiography gives place to one only, and that is the bacteriological investigation.

There is, however, another side to this picture. Though we owe so much to the skilled and critical radiologist, there is a type who diagnoses pulmonary tuberculosis when it does not exist; who professes to tell whether the disease is active or not; who speaks of peribronchial and hilar tuberculosis. To add still further to the confusion comes the inexperienced tomographist, who detects cavities in healthy cured patients and sometimes does not hesitate to tell them so. I think that there is no single radiographic appearance of tuberculosis that cannot be simulated by some other condition, even to the clear-cut rounded cavity with a fluid level. Therefore the shadow pattern must be interpreted in correlation with the clinical and especially the bacteriological findings. For example, carcinoma of the upper lobe with incipient atelectasis can simulate almost exactly a tuberculous infiltration with a small interlobar effusion in symptoms, signs, and radiographic appearances. It is the absence of tubercle bacilli that will suggest the correct diagnosis.

TREATMENT

In these days of special and spectacular treatments we may forget the healing power of Nature. Early lesions, widespread infiltration, and even large cavities may be completely cured by rest, good air, and a suitable diet.

Rest.—Of all treatments rest is the most important. It is the basis for the treatment of most types of tuberculosis and is the principle underlying the various surgical and semi-surgical interventions. It is not easy to explain why bodily rest should act so powerfully on an organ that is not itself at rest. The lung is moving less, it is true; but it is, nevertheless, moving. One reason perhaps is that by rest the bodily defences are conserved and augmented. Again, partial "atelectasis," by which is wrongly meant local collapse or deflation, can develop in the lungs of a patient lying for long periods. It is possible that this takes place selectively in the affected parts. This might be thought an unhealthy state of things and one conducive to the spread of the disease, but artificial pneumothorax shows that this is not so. The tubercle bacillus does not seem able to thrive in an airless or relatively airless portion of lung. Herein tuberculosis differs from most other diseases. Breathing exercises are good in empyema, bronchiectasis, unresolved pneumonia, bronchitis, and emphysema, but not in tuberculosis, and this is what is so infinitely difficult to make the patient understand. Rest must be *absolute* while there is any fever or any acuteness in the symptoms or any extension of the lesion. The patient should rest in the most comfortable position and neither feed nor wash himself. When the temperature has been normal for two or three weeks, movement can very gradually be promoted.

One day a physician from one of our dominions, visiting my wards, was asked what he would do with a young woman who had extensive bilateral infiltration of the lungs, and he replied: "I would put her in a plaster bed for a year." The principle of this is absolutely right for certain cases. An actual plaster bed, however, is a severe regime, and the patient will, if properly instructed, often make his own plaster bed by his will and determination.

The first activity allowed is the self-administration of food, then washing. Later the patient sits up for longer periods, then gets out of bed for a short time. Then walking is gradually allowed and the distances are extended, but this should be a very slow process. There is a tendency at many sanatoria to hurry the patient on too fast, partly for economy's sake and partly because of the shortage of nurses. I know the theory of the value of auto-inoculation induced by exercise, but increasing experience has taught me the greater value of rest. Rest in bed, preferably in the open air, for six to twelve months or more may be needed, and the progress should be checked by sputum examinations, temperature record, serial radiograms, and sedimentation-rate tests. These dreadful months of inactivity must be relieved and lightened by pleasant surroundings, hobbies, and occupational therapy. Moreover, we must see to it that the body does not become pale and flabby and the muscles wasted and lacking in tone. This may be prevented by exposing most of the body to air and sunshine after Rollier's method. It is this great pioneer's pride to show the muscles of a man, who has been lying in bed for a year or eighteen months, as firm and hard as an athlete's. There is no doubt that air and sun promote a healthy circulation and maintain muscle tone. There is a fear of sun and air to the naked body in pulmonary tuberculosis. This is unfounded. Just as a tuberculous knee-joint would flare up under too strong an application of sun, so may the chest; but sun, used in the way that Rollier uses it, is of the greatest benefit. If reactions are feared, the chest can be excluded from irradiation. Of all treatment I believe rest to be the most important. A patient will do better resting in bed in a hospital in the east end of London, than exercising in the air of Arizona or the high Alps.

Air and climate.—What the fundamentals of this are we do not know. That air should be fresh and free from dust, fog, chemicals, and infecting organisms is obvious; but, when it comes to the question of mountain or valley air, seaside or country, the subject becomes infinitely more difficult. Those who see the results of good treatment in high altitudes are naturally inclined to attribute too much to the climate and to consider sea air even dangerous, but this position is not easy to maintain. Some of our most

successful sanatoria are on the sea coast. I doubt if the place is of such great importance. As many special procedures are employed in the high Alps as elsewhere. It is the mode of life that matters.

Diet.—Here again, unfortunately, we are ignorant of the fundamentals. Merely to put on excessive fat is of doubtful value, though to gain weight is one of the indications of progress. The diet must be rich in vitamins. The proved value of cod-liver oil and malt is probably due to their content of vitamins A, B, and D, but it is probable that vitamin C is equally important. Natural vitamins should be used as far as possible, though there is no harm in supplementing with synthetic vitamins for a time. The diet should also have a rich mineral content. It is probably not so much a question of bulk as of quality. Raw eggs, butter, milk, and cod-liver oil and malt seem to merit the reputation they enjoy in the treatment of tuberculosis.

Medicinal treatment.—One of the remedies that has persisted since the days of Dioscorides in the reign of Nero is tar. At one time every patient was given creosote as a routine in some hospitals. None of us, I think, was certain of its value, if any, and today the tendency is to use calcium instead. A plausible case can be made out for the absorbable forms of calcium, which may be given as calcium sodium lactate gr. 20 three times a day, with vitamin D or as calcium gluconate by mouth or injection. I cannot give any scientific justification for this remedy, but I have observed many times that the patient will begin to put on weight only after taking calcium. Fraser (1927) is sceptical of its value in the chronic infections and is of the opinion that the work of Grove and Vines needs further corroboration.

Gold.—I find it difficult to speak of this remedy, for I am uncertain in my own mind. It certainly does not produce the sterilisatio magna in man or animals that was claimed in the early days of its reintroduction by Möllgard. It is toxic, it can produce severe reactions and complications, and yet in some cases it appears to do good. It seems to promote some sort of tissue reaction. More than this cannot be said. One uses it as one clutches at a straw. One prescribes it in some cases when an artificial pneumothorax is impossible, or when there is an acute extension to the opposite side. I may be wrong, but, though I have used it from the moment of its introduction, starting off with enthusiasm, and though I have seen what appeared to be remarkable and unimpeachable examples of its efficacy, I use it little now. I have seen some of my first wonderful cases relapse and die. I cannot help wondering whether it was not the added rest more than the gold that caused the disappearance of bacilli and the improvement of the clinical condition. Many examples of the supposed indisputable action of gold could be matched in the earlier descriptions of treatment by creosote, by Yeo's mask, or by nascent iodine.

Moreover, there is another remarkable and to me unexplainable phenomenon—the initial success of a new method. Two outstanding examples are Coley's fluid and Blair Bell's lead. As I look through my well-thumbed copy of Secher's (1926) large monograph on the treatment of tuberculosis with Sanocrysin I feel today that there is very little in it of real value and much that is utterly wrong. Nevertheless, gold excited the interest of many experts in tuberculosis, and it is still used extensively. When all is said, we must admit that gold is no specific. When the true specific chemotherapy is discovered, we shall be able to prove its value in a few weeks, and the knowledge will be flashed from one end of the earth to the other; and we may be allowed the hope that, in the not far distant future, the Mitchell lecturer will have the enviable task of announcing the chemical conquest of tuberculosis. When this comes, this lecture, together with whole libraries of literature on the subject, can be relegated to the bonfire or the museum.

Tuberculin.—There is little doubt that when a truth is announced it is capable of proof by workers in every part of the world and will be accepted by them. If tuberculin was of value in treatment, its position should have been established long before now. Far from its being established, we find opposing schools of thought on the subject. There are those who regard it as useless, those who regard it as a panacea, and those who use it as a placebo either for their patients or for themselves; some use it as a non-specific protein for mild shock therapy, and others use it in self-limiting and benign types of tuberculosis. It may be said, without fear of contradiction, that the greatest authorities have little faith in its value. I have succeeded several times in desensitising patients completely to tuberculin, with no effect whatever on the clinical course of the disease. I have tried different brands, as they have arisen, with the same result, and it is a strange and interesting commentary on the subject that these new brands should for ever be forthcoming, for each new production tacitly condemns the older as unsatisfactory or useless. One still thinks with surprise of the episode of the Dreyer diaplyte tuberculin, with its faulty premises and premature publicity.

The writings on the subject of tuberculin are innumerable. Opinions and results, as regards its place in treatment, prevention, and diagnosis, are conflicting. Do not these facts suggest that there is a misunderstanding of a phenomenon; that observations are twisted and turned to make them fit a theory? Whenever I think of tuberculin, there comes to my mind the phlogiston theory of combustion:—

> "Chemists have turned phlogiston into a vague principle which consequently adapts itself to all the explanations for which it may be required. Sometimes this principle has weight and sometimes it has not; sometimes it is free fire and sometimes it is fire combined with the earthy element; sometimes it passes through the pores of vessels, sometimes these are impervious to it; it explains both causticity and non-causticity, transparency and opacity, colours and their absence. It is veritable Proteus, changing in form at each instant."

Thus wrote Lavoisier. He tore the hypothesis to shreds and discovered oxygen. Perhaps a similar fate may overtake the tuberculin theories. Of one thing I feel convinced, that the allergic reaction has nothing whatever to do with immunity.

(To be concluded)

ANEURYSM OF THORACIC AORTA
TREATED BY WIRING WITH COLT'S APPARATUS

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The poor prognosis of thoracic aneurysm has led to many attempts at inducing coagulation within the sac mechanically, chiefly by the insertion of wire. The introduction of many yards of iron or silver wire, followed in some cases by passage of an electric current, has seldom, however, brought about improvement but, on the contrary, often proved hazardous or fatal. The main causes of failure have been the length of the operation; the severity of the hæmorrhage; the lack of control over the path of the wire, coils of which have entered the cavity of the heart or the main branches of the aorta; and sepsis. Colt designed his apparatus to overcome each of these obstacles; and cases have since been reported of successful cure of the aneurysm thereby. Since most of the cures due to wiring relate to the abdominal aorta, a successful result in a thoracic aneurysm is worthy of record.

APPARATUS AND TECHNIQUE

The part of Colt's wiring apparatus that is introduced into the aneurysm consists of a dull gilt wire

wisp, which can be folded up inside a cylindrical cartridge, while retaining sufficient spring to open, when liberated, like an umbrella across the aneurysmal sac. Two sizes of wisp are available: one packing to 2½ in. long and containing 75 in. of wire, the other to 3½ in. long and containing 105 in. of wire. For each size there is a corresponding container, with a special trocar, cannula, and piston for introduction of the wire umbrella. The whole apparatus is sterilised by separate boiling of its constituent parts. The cartridge of appropriate size is then loaded with the wisp so that its wires do not cross one another and will therefore open smoothly without becoming entangled.

Under local anæsthesia the trocar and cannula are introduced slowly into the most prominent part of the aneurysm. On withdrawal of the trocar a brisk spurt of blood will indicate successful entry into the cavity of the sac, an essential point of technique. The loaded cartridge is then attached to the cannula so that the free ends of the wires will be the first to enter the sac; the piston is inserted; and the wire wisp is pushed gently through the cannula until it lies free within the aneurysm. No force must be used, and the position of the end of the cannula should, if necessary, be adjusted so that the wisp can be pushed home without resistance. The cannula is then quickly withdrawn, the puncture sealed with collodion, and a dressing applied. It has been well established, as claimed by Colt, that the presence of the dull gilt wire wisp, properly introduced, is sufficient to initiate within a short time clotting in a saccular aneurysm, even though the patient is syphilitic; and that the wire does not become broken or eroded but remains in position without causing trouble, even after many years. No advantage is gained by the passage of electrical currents after insertion of the wire, but the patient should be kept strictly at rest and given adequate antisyphilitic treatment. General measures to assist coagulation are also appropriate immediately after wiring.

CASE-RECORD

A male, aged 51, first seen on July 7, 1936, as an outpatient at the Southend General Hospital, had had a severe aching pain for the past month in the right pectoral region, radiating at times to the back and inner aspect of the right arm. Dyspnœa on effort had also been noticed, with considerable loss of weight, but cough and sputum were absent. The past medical history was negative, apart from a war injury in 1918 causing loss of the right arm below the shoulder. No venereal infection was admitted.

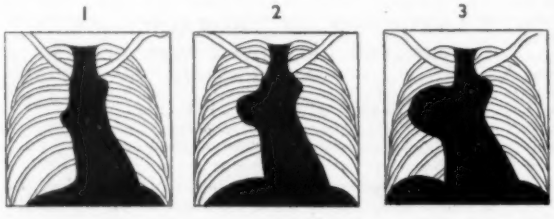

FIG. 1—Aneurysm of thoracic aorta in July, 1936.
FIG. 2—Same aneurysm as in fig. 1 on Oct. 13, 1936.
FIG. 3—Same aneurysm ten days after insertion of wire.

The patient was poorly nourished. Much dental sepsis was present. Clinical examination of the heart showed nothing abnormal except an accentuation of the second sound at the aortic area. No abnormal pulsation was seen, and pressure phenomena were absent. The blood-pressure was 124/68 mm. Hg. A few râles were heard over both apices and at the right base. Examination of the abdomen, nervous system, and urine showed no abnormality.

Radiography of the chest revealed a small dense rounded shadow at the right hilum (fig. 1), which on screening was seen to pulsate and to resemble an early aneurysm of the ascending aorta. The lung fields were clear. An electrocardiogram was normal. Blood Wassermann and Kahn reactions were strongly positive. A localised saccular aneurysm arising from the ascending aorta was diagnosed.

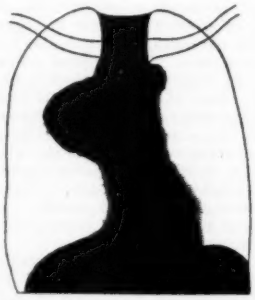

FIG. 4—Sketch of kymogram, taken on Sept. 16, 1938, showing absence of expansile pulsation in the sac of the same aneurysm as in figs. 1–3.

The patient was kept strictly at rest in bed for a month, and a mixture containing liquor hydrargyri perchloridi 1 drachm, and potassium iodide gr. 30 was given by mouth. Pain was considerably relieved at first, but three weeks after admission it was noted that, notwithstanding the improvement in symptoms, slight expansile pulsation could be felt in the second right interspace. After a month in hospital the patient was transferred home to continue rest in bed and to complete a course of intramuscular injections of bismuth.

When he was next seen, on Sept. 8, 1936, no improvement was found, the slightest exertion bringing a severe stabbing pain to the right of the sternum and back. At rest there was a constant dull ache in the same area, disturbing sleep and requiring an opiate. The patient was readmitted to hospital on Oct. 9, 1936, by which time a bulge had appeared on the chest wall, with obvious expansile pulsation and concomitant signs of aneurysm, shown by a systolic heave and diastolic shock, with a widespread impairment of percussion note. The aortic valves, however, remained competent, with blood-pressure 130/76 mm. Hg. Peripheral œdema and pulmonary signs were absent, and no blood was expectorated.

Thereafter the bulging upon the front of the chest grew rapidly more prominent. X-ray screening and films on the 13th (fig. 2) showed that within two months the aneurysm had more than doubled its size and had reached and involved the anterior chest wall, although the overlying skin remained healthy. The patient was now conscious of deep pulsation within the chest. In view of the constant pain and the progressive yielding of the sac, the outlook appeared poor unless something further could be done. Arsenical treatment was considered, but deemed unwise in view of a possible Herxheimer reaction with rupture of the aneurysm. The case seemed, however, to conform to the criteria of suitability for wiring, and with the patient's willing agreement this course was decided on.

On Nov. 3, 1936, the wiring was carried out with Colt's apparatus as already described, the smaller trocar and cannula being used. A preliminary sedative of Omnopon and hyoscine was given and local anæsthesia alone employed. The introduction was made without difficulty, the patient experiencing a sense of heavy pressure but no pain. After withdrawal of the cannula gentle pressure was applied over the site of insertion, which was protected by a gauze pad kept in place with Elastoplast. There was no external bleeding.

Directly after the operation the pulse was poor, but it rapidly improved in quality during the day and thereafter maintained its good volume, no distress being evident. Morphia gr. ¼ was given and repeated the same evening. To assist coagulation, hæmoplastin 4 c.cm. was given intramuscularly and 10 c.cm. of a 10 per cent. solution of calcium gluconate intravenously, both being repeated daily for the next twelve days. The patient was kept strictly recumbent, all straining being avoided and fluids reduced to a minimum.

On the day after the wiring the general condition was satisfactory, with no evidence of bleeding or external

change in the condition of the aneurysm. Little disturbance of the heart's action was apparent except for an increase of rate to 100–110 a minute. At the apex the heart sounds appeared unchanged, but over the aneurysm a coarse grating sound was heard during systole, probably produced by friction of adjacent fibrils of the wire wisp. The second sound at the aortic area preserved its clear ringing tone. No symptoms were complained of apart from a bruised feeling at the site of the wiring and thirst attributed to restriction of fluid intake.

On the third day after operation, however, the bulge of the chest wall appeared to have become more prominent, with widening of the area of pulsation and accompanying tenderness. Although there was no discoloration of the skin and general signs of hæmorrhage were absent, it was thought that local oozing of blood might have taken place round the sac through the point of puncture, with consequent danger of rupture. Within a few days, however, the swelling and the pulsation were much less. On the tenth day, when the supporting bandage was removed, the skin was found to be normal. The patient felt well and was free from symptoms, with a pulse-rate of 80–90 and a normal blood-count. A radiogram at this stage showed a slight haze round the sac, whose margins were less clearly defined (fig. 3). Subsequent progress of the patient was uneventful, with notable relief from the pain. As the aneurysm became smaller and less pulsatile, it became progressively harder. The patient was allowed to leave hospital seven weeks after insertion of the wire and remained in bed at home for a further month.

He has since remained under observation, with periodic X-ray control. In view of the apparent arrest of the aneurysm a gradual increase in his activities was allowed. Six weeks after leaving hospital he could walk for 10–15 min. without pain or dyspnœa, while the general condition had shown a steady improvement, with gain in weight and recovery of strength. The swelling upon the chest wall was then slight, hard, and insensitive, and showed no expansile pulsation on clinical or X-ray examination. Over it the heart sounds were audible and normal, and nothing was found wrong with the heart. Radiography showed a dense rounded shadow, whose margins were no longer blurred but sharply defined, with the wire umbrella lying open and unchanged in position. Serial radiograms taken at intervals of about three months over a period of more than three years have not shown any change in the size or outline of the sac or of its contained wire wisp. Apparently the sac is filled with densely organised clot and the disease has been arrested. A kymogram (fig. 4), taken by Dr. Franklin Wood at the London Chest Hospital on Sept. 16, 1938, confirms the absence of expansile pulsation in the sac.

From the clinical aspect the progress of the patient has similarly been uneventful, except for a flare-up of gingivitis and stomatitis due to antisyphilitic treatment, necessitating an extraction of teeth in September, 1937. No disturbance of the chest condition followed, and the gums healed normally. Over the greater part of the time mercury and potassium iodide have been given by mouth, with short courses of bismuth given intramuscularly. The blood Wassermann and Kahn reactions, strongly positive at the start of treatment, have both remained negative since March, 1939. In December, 1939, the patient appeared fit and could walk several miles without discomfort or dyspnœa and carry out the normal activities of life.

DISCUSSION

It may fairly be claimed from the patient's progress that the introduction of the gold wire brought about clotting within the sac of the aneurysm and thereby arrested the disease. In assessing results of treatment the normal duration of life with aortic aneurysm apart from interference has to be borne in mind. This was the subject of a detailed investigation by Colt (1927), his series of 707 cases including 182 males with aneurysm of the ascending aorta, and the average age of onset being fifty. Of this group about a quarter had died within five months from the date of the diagnosis, a further quarter within fifteen months, and a like proportion within two years, the average duration of life after diagnosis being therefore considerably less than this period. In the present instance the wiring has given the patient over three years of good health, with relief from the severe pain and other serious symptoms of his illness, and a reasonable prospect of continued fitness, if not of permanent cure.

A review of published records of abdominal and thoracic cases shows that greater prospect of success with Colt's apparatus is offered by aneurysms of the abdominal aorta, in which surgical access and exposure are easier. The average duration of life in this group was increased and included such long-standing survivals as eighteen years (Wheeler 1933) and ten and a half years (Lawson 1913). In the thoracic aneurysms the results showed greater variation and the proportion of early failures was higher from such causes as gradual leakage into the mediastinum or the pleura. Some of the thoracic cases were, however, in an advanced stage, offering little prospect of cure at the time of wiring, for which they would not now be considered suitable.

From a study of these cases Colt gave the following indications for wiring:—

(1) The aneurysm must be definitely saccular and not merely part of a diffuse dilatation of the aorta.

(2) The patient's age, general state, and cardiovascular condition, apart from the aneurysm, should offer a reasonable prospect of good health, if he should survive the operation.

(3) Failure of the aneurysm to respond to preliminary rest and antisyphilitic treatment over a period of two to three months, with a rapid and progressive increase in size of the sac, is an indication for wiring if otherwise suitable.

(4) The aneurysm should have reached and involved the chest wall and so be accessible under local anæsthesia. The strain of open exposure under a general anæsthetic is thus obviated. Wiring, however, should not be delayed until the chest wall has become weakened and the skin eroded.

The most favourable thoracic type for wiring was that arising from the ascending arch, aneurysms of the transverse and descending aorta being seldom

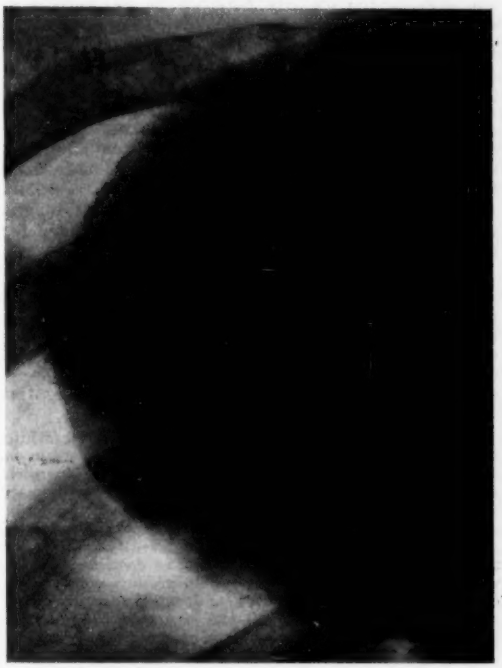

FIG. 5—Radiogram of sac of aneurysm, showing wire wisp in position.

suitable. The case described in this article conforms in general to the indications given above.

SUMMARY

A case is described of saccular aneurysm of the ascending aorta successfully treated by wiring with Colt's apparatus. Observation over more than three years since the operation has shown no further change in the size and condition of the sac, which appears to be thrombosed and inactive, and the patient has remained free from symptoms and able to lead an active life. A brief review is given of other recorded cases and of the indications for this form of treatment.

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SULPHATHIAZOLE IN BUBONIC PLAGUE

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THE highly standardised method developed by one of us (S. S. S.) for biological assay of anti-plague vaccines (Sokhey and Maurice 1935) and sera (Sokhey 1939a) has enabled us to assess fairly accurately the therapeutic value of several drugs, including some of the more important sulphanilamide derivatives, in bubonic plague. None of the compounds tested by us proved to be entirely satisfactory. Last year we organised at the Haffkine Institute, with the help of the Lady Tata Memorial Trust, the synthesis of new compounds, particularly heterocyclic derivatives of sulphanilamide. Of the thirty-five compounds prepared (Ganpathi 1940a and b, Ganpathi and Nandi 1940) we have tested only six so far. One of these, sulphathiazole, the synthesis of which has been reported by Fosbinder and Walter (1939) and by Lott and Bergeium (1939), is very effective in plague. We here give the results obtained with this drug and with sulphapyridine (M. & B. 693), the only other drug found to have some action in plague (Schutze 1939). A few experiments showing the effect of anti-plague serum prepared at the institute are also included for comparison.

METHOD OF TESTING

The method of testing was so devised that the laboratory-induced infection should simulate natural infection as closely as possible, and all the steps of the experiments were accurately standardised, so that results of experiments carried out at different times should be directly comparable. Essential details of the method are as follows:

Test animal.—The Haffkine Institute inbred white mouse was used for these experiments. This strain is uniformly and constantly susceptible to infection with plague (Sokhey 1939c). The mice used were two and a half to four months old and weighed 21–30 g. (Any other strain of mice equally susceptible to plague infection would do. The strain of mice should be such that 6–12 organisms of a suitable strain of *Pasteurella pestis*, as described below, when injected subcutaneously should produce a mortality of not less than 90 per cent.; and, when ten times this infective dose—i.e., about 60–120 organisms—is given, a uniform mortality of 100 per cent., with an average duration of life of about five to seven days, should result.)

Test infective dose.—This was 0·2 c.cm. of a 10^{-6} dilution (in broth) of a 48-hour broth growth (incubated at 27°–29° C.) of a suitable strain of *P. pestis* per mouse. It was always given subcutaneously in the right flank of the animal. Such a dose contains about 60–120 organisms (Sokhey 1939b). Our experience is that agar cultures obtained directly from the blood in fatal human cases are highly virulent, and their virulence can be maintained undiminished for at least three years by storing them at about 4° C. (Sokhey 1939d). Strains for our work were selected by using the test infective dose described above.

Mode of administration of the drug.—The drug under test was made into an emulsion with tragacanth so that 0·5 c.cm. of the emulsion contained the required dose. This quantity of the emulsion was introduced with a pipette into the stomach of the mouse. The drug was usually administered twice a day, at 9 A.M. and 9 P.M.; in a few experiments it was given only once a day, and in some others three times a day, at 7 A.M., 3 P.M., and 11 P.M. For our experiments we have employed dosages from 10 mg. a day for ten days to 40 mg. twice a day for ten days.

Time of starting the administration of the drug.—Experiments have been reported in which the administration of the drug was started at the same time as the infection was given (Schutze 1939). Such experiments are of limited value, as the results given below will show. In cases of human plague the most important factor which decides the issue is the development of septicæmia. In mice, under the experimental conditions described in this paper, septicæmia develops forty-eight to seventy-two hours after the induction of infection by the subcutaneous route. We therefore started the administration of the drug at four different stages of the infection: (1) at the same time as the infection was given, (2) twenty-four hours after infection, (3) forty-eight hours after infection, and (4) seventy-two hours after infection.

Number of animals used for each experiment.—For each test 20 animals were used; the selected dose of the drug under test was given to 10 mice, and the remaining 10 mice were kept as controls. During the experiments the mice were kept in batches of 5 in the special cage designed for experimental work in tropical countries (Sokhey 1939c). The cages were housed in an air-conditioned room with a temperature of 75°–78° F.

Duration of the experiments.—The mice were observed for at least thirty-one days. They were examined once a day, and deaths were noted. Those dying within this period were dissected and examined for evidence of plague by microscopical examination of organ smears, and failing that by cultural methods. Whenever possible the animals which survived were killed after the end of the period of observation and similarly examined.

RESULTS

The results are given in tables I–IV according to the four different stages of infection at which the administration of the drugs was begun. Plague organisms were never found in the organ smears and blood-cultures of the animals dying during the period of administration of the drugs, but they were found in animals dying after the administration of the drug had been stopped, the only exception being in the experiments in which sulphapyridine was given in very small dosage—i.e., 10 mg. once a day for ten days. In this case some animals which died during the period of administration of the drug showed the presence of plague organisms.

COMMENTS

During our recent studies in the field we have noticed that the most important single factor which decides the issue in human plague is the development of septicæmia. If the lymph-glands prevent the spread of infection to the blood-stream and the infection remains localised spontaneous recovery invariably results. The percentage of such cases in different outbreaks is 20–50 per cent. On the other hand, if the organisms pass the lymph-glands and a septicæmia results death invariably follows unless an effective agent can be given to control the infection. Even if an effective agent is available it must be given before extensive destruction of the tissues of the organs has resulted. In the mouse 100 per cent. of the animals infected with our standard test infective

TABLE I—ADMINISTRATION OF DRUG BEGUN AT TIME OF INFECTION

Expt. no.	Drug	No. of organisms given as test infective dose	Mice used	Deaths during period of administration of drug (1st to 10th day)	Deaths after drug was stopped (11th to 31st day)	Controls: Mice used	Controls: Deaths
Dose—10 mg. twice a day for 10 days							
1	Sulphathiazole	80	10	0	1 (19·0)*	10	10 (5·7)
2	Sulphathiazole	66	10	0	3 (20·6)	10	10 (5·6)
1	Sulphapyridine	79	10	0	3 (16·3)	10	10 (6·8)
2	Sulphapyridine	63	10	0	3 (22·0)	10	10 (5·3)
3	Sulphapyridine	66	10	1 (8·0)	4 (17·0)	10	10 (5·6)
Dose—20 mg. twice a day for 10 days							
1	Sulphathiazole	146	10	0	1 (21·0)	10	10 (5·7)
Dose—10 mg. once a day for 10 days							
1	Sulphapyridine	69	10	9 (7·4)	1 (11·0)	10	10 (5·6)

* Drug in this experiment was given for 20 days—i.e., 10 mg. twice a day for 20 days. The figures given in parentheses are the average number of days elapsing between infection and death.

TABLE II—24 HOURS AFTER INFECTION

Dose—10 mg. twice a day for 10 days							
1	Sulphathiazole	80	9	0	2 (15·5)	10	10 (5·7)
2	Sulphathiazole	66	10	1 (8·0)	1 (11·0)	10	10 (5·6)
1	Sulphapyridine	79	10	0	2 (22·0)	10	10 (6·8)
2	Sulphapyridine	63	10	0	0	10	10 (5·3)
3	Sulphapyridine	66		0	3 (19·3)	10	10 (5·6)
Dose—20 mg. twice a day for 10 days							
1	Sulphathiazole	146	10	0	0	10	10 (5·7)
Dose—10 mg. once a day for 10 days							
1	Sulphapyridine	69	10	8 (6·3)	2 (12·0)	10	10 (5·6)

TABLE III—48 HOURS AFTER INFECTION

Dose—20 mg. twice a day for 10 days							
1	Sulphathiazole	80	10	0	1 (12·0)	10	10 (5·7)
2	Sulphathiazole	66	10	3 (6·6)	0	10	10 (5·6)
1	Sulphapyridine	132	10	6 (4·8)	4 (18·5)	10	10 (4·9)
2	Sulphapyridine	66	10	5 (6·4)	1 (12·0)	10	10 (5·6)
Dose—40 mg. twice a day for 10 days							
1	Sulphathiazole	56	10	1 (6·0)	0	10	10 (6·7)
1	Sulphapyridine	66	10	6 (5·8)	3 (22·3)	10	10 (5·2)
Dose—20 mg. thrice a day for 10 days							
1	Sulphathiazole	56	10	1 (6·0)	0	10	10 (6·7)

TABLE IV—72 HOURS AFTER INFECTION

Dose—20 mg. twice a day for 10 days							
1	Sulphathiazole	146	10	3 (6·6)	0	10	10 (5·7)
2	Sulphathiazole	66	10	4 (7·0)	0	10	10 (5·6)
1	Sulphapyridine	132	10	8 (5·6)	2 (19·0)	10	10 (4·9)
2	Sulphapyridine	66	10	8 (5·6)	1 (13·0)	10	10 (5·6)
Dose—40 mg. twice a day for 10 days							
1	Sulphathiazole	56	10	2 (7·3)	0	10	10 (6·7)
1	Sulphapyridine	66	10	8 (5·9)	1 (30·0)	10	10 (5·2)
Dose—20 mg. thrice a day for 10 days							
1	Sulphathiazole	56	10	3 (7·3)	0	10	10 (6·7)
Dose—0·1 c.cm. a day for 4 days; first dose given intravenously and subsequent ones subcutaneously							
1	Haffkine Inst. anti-plague serum	141	10	0	2 (26·0)	5	5 (5·2)
2	Haffkine Inst. anti-plague serum	30	10	0	2 (17·5)	10	10 (6·3)
3	Haffkine Inst. anti-plague serum	108	10†	0	1 (18·0)	10	10 (5·7)

† One mouse died before serum could be given.

dose develop septicæmia regularly, and this septicæmia develops forty-eight to seventy-two hours after the induction of infection. Seventy-two hours after the giving of infection 100 per cent. of the mice have septicæmia, yet only in a very few animals is the injury to organs so extensive as to make recovery impossible.

From this standpoint the results obtained by starting the administration of the drugs at four different stages of the infection can be better evaluated if they are viewed as forming only two groups. Septicæmia does not set in until forty-eight hours after the induction of infection; therefore the cases in which administration of the drug was started at the same time as infection (table I) and twenty-four hours after the giving of infection (table II) really form one group. There is no significant difference in the intensity of infection at these two stages, while they have in common the important factor of the absence of septicæmia at the start of the treatment. Similarly the results obtained by starting the administration of the drugs forty-eight hours (table III) and seventy-two hours (table IV) after the induction of infection form a common group in which septicæmia was already present at the start of the treatment. For reasons given above the results of the second group are more significant for assessing the value of the drugs under test.

When the administration of the drug was begun before septicæmia had set in, as small a dose of sulphathiazole as 10 mg. twice a day for ten days saved nearly 80 per cent. of the infected animals, and even better results were obtained by doubling this dose. Sulphapyridine produced about the same action as sulphathiazole in these early stages of infection with doses of the same order. In the second group however—i.e., when the administration of the drugs was started after septicæmia had set in—the remarkable action of sulphathiazole in curing plague becomes more evident. A dose of 20 mg. twice a day for ten days cured approximately 80 per cent. of infected animals when the drug was given forty-eight hours after infection and 65 per cent. when given seventy-two hours after infection. Doubling this dose produced even better results, the survivals becoming 90 and 80 per cent. respectively. These results are as good as those obtained with the Haffkine Institute anti-plague serum (table IV). It is in this significant group that sulphathiazole shows much more definite curative action than sulphapyridine. With the largest dose employed (40 mg. twice a day for ten days), when treatment was started forty-eight hours after infection, sulphathiazole cured 90 per cent. of infected animals, whereas sulphapyridine cured only 10 per cent., and similar results were obtained when treatment was started seventy-two hours after infection.

The rate of absorption and excretion of a drug influences its action to a considerable extent, and comparison of two drugs by giving similar doses is fallacious if their rates of absorption and excretion are not similar. Sulphathiazole has been reported to be absorbed and excreted much more rapidly than sulphapyridine. In our comparison of the effect of the two drugs we have, therefore, given large doses to produce the maximal possible effect. Tables III and IV show that the effect of sulphapyridine in doses of 20 mg. twice a day for ten days was the same as that of 40 mg. twice a day for ten days; and no advantage was gained by doubling the dose. Doubling the dose of sulphathiazole slightly improved the percentage of cures. It is evident that in both cases any doses higher than 40 mg. twice a day would not have materially affected the results.

These animal experiments show sulphathiazole to have a remarkable curative action in plague and to be superior to sulphapyridine in this respect. Since plague is much more severe in the mouse than in man—in man the case-mortality is never 100 per cent.—it is hoped that sulphathiazole will prove even more effective in human infection, and we hope to try it out in the field soon.

SUMMARY

(1) Sulphathiazole in doses of 10 mg. twice a day for ten days cures 80 per cent. of plague-infected mice when administered at the time of infection or twenty-four hours after. Still better results are obtained if the dose is increased.

(2) If treatment is begun forty-eight or seventy-two hours after infection, a dose of 40 mg. twice a day for ten days cures 80–90 per cent. of infected mice.

(3) Under experimental conditions sulphathiazole is much superior to sulphapyridine in plague and is as good as an effective anti-plague serum.

Our thanks are due to Messrs. May and Baker for a generous supply of sulphapyridine (M. & B. 693).

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TIME-RELATIONS OF HEPARIN ACTION ON BLOOD-CLOTTING AND PLATELET AGGLUTINATION

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Howell and Holt (1918) demonstrated that heparin, administered intravenously or added to blood outside the body, delayed the clotting of the blood. As Howell predicted, it was found that highly purified heparin stopped the agglutination of blood-platelets, thus preventing the formation of a thrombus. This is true whether the stimulus to thrombus formation is present in the animal's blood-vessels (Murray et al. 1936) or in a glass or Cellophane tube through which the blood is allowed to flow (Best et al. 1938). That blood-clotting and thrombosis may, under certain conditions, be separate processes can be deduced from the facts that platelet-free blood may clot, and that platelet thrombi, containing no detectable amounts of fibrin, may form. In 1904 Loeb studied the action of the anticoagulant hirudin, which prevented the agglutination of platelets. He showed that the effect on platelets developed more slowly than that on clotting. In the present work we have studied the time-relations of heparin action on blood-clotting and platelet agglutination.

METHOD

Clotting times were measured on 1 c.cm. samples of blood withdrawn from a vein into a hypodermic syringe as little negative pressure as possible being used. The blood was then allowed to flow slowly down the wall of a small test-tube. All equipment coming in contact with the blood was carefully cleaned and dried before use. Samples were taken from an exposed femoral vein, each new site of puncture being distal to the previous one. The state of the blood was observed at short intervals by gently tilting the tubes.

Platelet agglutination in dog's blood was studied in a glass cell (Best et al. 1938) which connected the carotid artery with the jugular vein (fig. 1). The top plate of this cell had a transverse scratch on its inner surface, and platelets tended to clump first on the downstream side of this scratch. Although the initial deposition of platelets was on the scratch, this was quickly followed by the clumping of other platelets on those already immobilised; the process observed was thus, for the most part, a true agglutination. Two cells were used in most of the experiments cited. A microscope (× 50) was focused on the scratch in each cell, which was illuminated by transmitted light. The appearance of clumps, or the growth of clumps already present on the scratch, indicated active platelet agglutination. The absence of clumps or the progressive reduction in size of clumps present indicated that little or no platelet agglutination was taking place. In practice these conditions were easily recognised.

Dogs under Nembutal anæsthesia were used. Highly purified heparin (Connaught Laboratories, Toronto) was administered intravenously in an aqueous solution containing 100 units per c.cm. The protamine used was in an aqueous solution containing 1 mg. of protamine per 0·04 c.cm., and this amount inactivates (Chargaff and Olson 1938) 33 units (0·33 mg.) of heparin.

TABLE I—DELAY IN EFFECT OF HEPARIN ON THROMBUS FORMATION

Heparin administered (units per kg. of body-weight)	Maximal clotting-time	Thrombus formation following administrations of heparin
50	Over 6 hours	Continuous
100	"	"
150	"	"
200	"	"
300	"	May be continuous or may cease approximately 1 hr. after heparin given
350	"	Ceases approximately 50 min. after heparin given
450	"	Ceases approximately 20 min. after heparin given

RESULTS AND DISCUSSION

The present experiments may be divided into two groups. In the first a single dose of heparin was

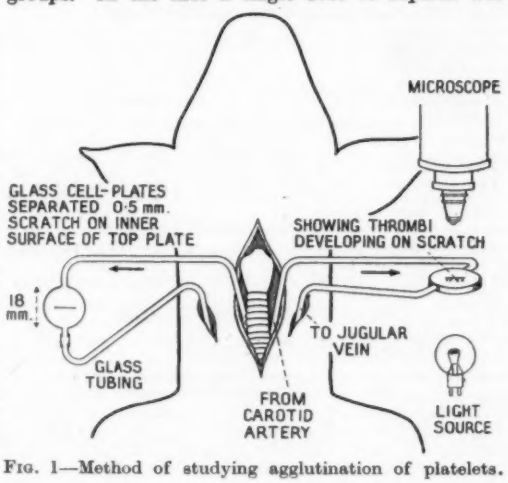

FIG. 1—Method of studying agglutination of platelets.

given and clotting-time and thrombus formation observed. In the second a large dose was administered and, approximately 35 min. later, blood flow through the cells was started and the heparin neutralised by the required amount of protamine. Clotting-times were taken approximately every 10 min. at the beginning and towards the end of each experiment. The cells were watched for thrombus formation. After the flow through the glass cell is started, there is always a latent period (average 6 min.) before thrombi are observed. The agreement between the results obtained with the two cells was remarkable. After a large dose of heparin the reappearance of thrombi might be delayed for 5–6 hours, yet the time of reappearance in the two cells differed only by a few minutes. This finding strongly suggests that the scratch on the inner surface of the cell constituted maximal stimulus for platelet agglutination.

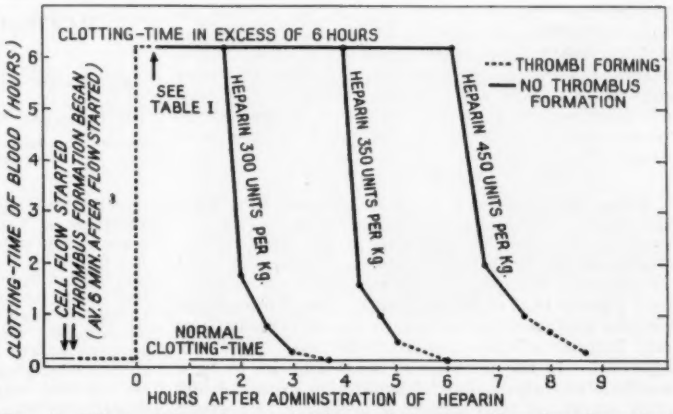
CLOTTING-TIME IN EXCESS OF 6 HOURS
SEE TABLE I
HEPARIN 300 UNITS PER KG.
HEPARIN 350 UNITS PER KG.
HEPARIN 450 UNITS PER KG.
THROMBI FORMING
NO THROMBUS FORMATION
CELL FLOW STARTED
THROMBUS FORMATION BEGAN (AV. 6 MIN. AFTER FLOW STARTED)
NORMAL CLOTTING-TIME
CLOTTING-TIME OF BLOOD (HOURS)
HOURS AFTER ADMINISTRATION OF HEPARIN

FIG. 2—Effect of heparin on platelet agglutination (thrombus formation) and clotting-time of blood in the dog.

Fig. 2 shows the result of the first group of experiments. Each curve showing the return of clotting-time and platelet agglutination was obtained in one animal. As pointed out by Jaques (1939), there is great variation in the response of different dogs to heparin. In the same animal, however, from the effect of the first injection the results of the subsequent administration can be fairly accurately predicted. After a dose of heparin in excess of 300 units per kg. of body-weight the clotting-time of the blood very quickly reached a high value (over 6 hours), whereas platelet agglutination continued for 15–50 min. As shown in table I, smaller doses, while increasing the clotting-time of the blood, did not stop platelet agglutination. With the large doses of heparin the clotting-time of the blood, after 3–6 hours had elapsed, returned to under 1 hour before platelet agglutination started again. In our experiments the larger the dose of heparin, the longer the interval before thrombi reappeared, but the longer the clotting-time at the moment of reappearance. In considering these results it is essential to remember that the method used for detecting platelet agglutination gives an immediate answer, whereas the measurement of clotting-time necessarily yields a delayed result. It is sometimes forgotten that a clotting-time of 6 hours can only be determined by observing a sample of blood for 6 hours. The clotting-time depends on the conditions under which the blood is kept. The physical and chemical processes which lengthen the clotting-time are not necessarily fully developed when the blood sample is taken. We measure the anticoagulant action of heparin by observing the length of time during which the blood remains fluid. We have no means, as yet, of determining the margin of this control, although it may prove to be of practical importance.

Table II shows the outline and the results of the second type of experimental procedure. As indicated, the administration of a quantity of protamine sufficient to neutralise the large initial dose of heparin brings the clotting-time, almost at once, to normal or subnormal levels. The reappearance of thrombi was observed during the injection of the protamine. Thus, whereas the inhibitory action of heparin on platelet agglutination takes some time to develop, this effect disappears as soon as the heparin is removed. Administration of protamine after heparin to the animals which had a long normal clotting-time immediately lowered this value below the original level. Several groups of workers have now shown that heparin may appear in the blood-stream under certain conditions. Our findings may be interpreted as supporting the view that heparin may sometimes be present in the blood of normal dogs under nembutal

TABLE II—OUTLINE AND RESULTS OF HEPARIN-PROTAMINE EXPERIMENTS

Elapsed time for each phase of procedure	1 min. or less	1 min. or less	1 min. or less	5 min.	1 min. or less	Approx. 30 min.	1 min. or less	10 min.	3–5 min.	5 min.	1 min. or less
Procedure	Blood sample for clotting-time (CT) measurement taken (sample 1)	→	Heparin (450 u./kg.) administered	→	Blood sample for CT taken (sample 2)	→	Cell flow started	→	Protamine given to neutralise heparin (1 mg./33 u.)	→	Blood sample for CT taken (sample 3)
Exp. No.	Clotting-time of sample 1 (min.)	..	..	..	Clotting-time of sample 2	..	..	Thrombus formation		..	Clotting-time of sample 3 (min.)
1	14	..	..	..	Over 6 hr.	..	..	None	Starts during protamine injection	..	7
2	6	..	..	..		..	..			..	6
3	7	..	..	..		..	..			..	5
4	9	..	..	..		..	..			..	6
5	7	..	..	..		..	..			..	6
6	8	..	..	..		..	..			..	6
7	9	..	..	..		..	..			..	8
8	5	..	..	..		..	..			..	5
9	33	..	..	..		..	..			..	8

anæsthesia. An alternative explanation is that the injection of heparin, like that of hirudin (Országh and Alföldy 1940), leads to the production of some substance which accelerates blood coagulation. In many experiments, however, in which heparin has been administered, and natural removal permitted, no return below the normal clotting-time has been observed.

CONCLUSIONS

From the foregoing it becomes apparent that, from the practical standpoint, heparin develops its characteristic effect on clotting-time with little delay. With carefully graded dosages of heparin it is possible to observe a definite delay in the action on clotting-time (Quick 1936; Jaques 1939). The inhibition of platelet agglutination, as judged by our criteria, may not become obvious until 15–50 min. after the injection. In the presence of what appears to be a maximal stimulus a dose of heparin in excess of 300 units per kg. of body-weight is necessary to prevent agglutination. Smaller doses, which raise the clotting-time to over 6 hours, do not prevent platelet agglutination; this has been observed previously in the rabbit (Best et al. 1938). It has been shown that thrombosis in veins (Murray et al. 1936), arteries (Solandt and Best 1938), and on cardiac endothelium (Solandt, Nassim, and Best 1939) can be completely prevented by doses of heparin which are much smaller than the above. This indicates that extensive damage to these parts did not produce a maximal stimulus to platelet agglutination. In view of the absence of effect on agglutination of doses of heparin which produce a clotting-time of over 6 hours, it is noteworthy that, after a large dose has been administered, platelet agglutination will not start again until the clotting-time of the blood has returned to less than 1 hour. In spite of this the sudden removal of the heparin by protamine led to the immediate onset of platelet agglutination. These findings suggest that, in the presence of even a little heparin, an effect on agglutination previously produced by a higher concentration may persist.

SUMMARY

A single dose of heparin sufficient to raise the clotting-time of the blood of the anæsthetised dog to over 6 hours did not prevent the agglutination of platelets in the presence of what appeared to be a maximal stimulus.

With larger doses of heparin the effect of platelet agglutination, unlike that on the clotting-time, took 15–50 min. to develop under the conditions of our experiments. This point should be remembered in experimental or clinical studies with heparin.

Evidence is presented which suggests that even the most extensive injury to arteries or veins never results in a maximal stimulus to platelet agglutination. The dose of heparin necessary to prevent the formation of platelet thrombi in an injured blood-vessel is, for this reason, much smaller than that required to prevent the process in a glass cell.

The findings suggest that, in the presence of even a little heparin, an effect on agglutination previously produced by a higher concentration may persist.

It is a pleasure to record our appreciation of the technical assistance given by Mr. C. R. Cowan.

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PATHOLOGICAL FRACTURE OF MANDIBLE

NON-UNION TREATED WITH PEDICLED BONE GRAFT

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A SEAMAN, aged 52, was admitted to the Seamen's Hospital on Jan. 1, 1935. He had then been ill for some seven months with osteomyelitis of the lower jaw following extraction of teeth in the left premolar and molar regions. An abscess had formed which had been opened at another hospital. Before his admission under my care seven sequestra had been discharged. On admission there was considerable swelling of the left side of the face and of the soft tissues overlying the lower jaw on the left side, and an external sinus was discharging pus. Inside the mouth pus was observed to well up freely from the area involved. Radiography showed a fracture in the region of the angle of the mandible on the left side (fig. 1). On the 16th loose sequestra were removed. On Feb. 13 more sequestra were removed, the distance between the separated ends of the mandible then being ¾ in. On the 26th two small sequestra were exfoliated, and at this time splints were cemented in position by Mr. Bramley Ball, honorary dental surgeon to the hospital. It was recognised that a condition of non-union had been established, and that some form of grafting operation would have to be undertaken. In view of the suppuration, it was decided to wait a considerable time to allow latent sepsis to subside; consequently operation was postponed until January, 1936. The condition immediately after operation is illustrated in fig. 2. Subsequent progress was uneventful, and the patient was discharged on May 21, 1936.

FIG. 1—Radiogram showing a pathological fracture at the angle of the mandible.

OPERATION

A detailed and illustrated description of the operation performed was given in my Hunterian lecture (1918). Briefly, the procedure is to bridge the gap

(*Continued from previous column*)

Jaques, L. B. (1939) *Ibid*, **125**, 98.
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Murray, D. W. G., Jaques, L. B., Perrett, T. S. and Best, C. H. (1936) *Canad. med. Ass. J.* **35**, 621.
Országh, O. and Alföldy, J. (1940) *Lancet*, Jan. 6, p. 28.
Quick, A. J. (1936) *Amer. J. Physiol.* **115**, 317.
Solandt, D. Y. and Best, C. H. (1938) *Lancet*, **2**, 130.
— Nassim, R. and Best, C. H. (1939) *Ibid*, **2**, 592.

between the fragments with a portion of bone removed from the lower border of the jaw in front of the site of non-union. The size and shape of the bone thus transferred can be judged from the radiogram (fig. 2), which shows the condition immediately after operation. The essential feature wherein this method differs from the introduction of a completely detached graft usually taken from another bone, such as ilium, rib, or tibia, is that the blood-supply of the bone transferred is maintained by the preservation of the attachment to it of the platysma and deep fascia and by the utilisation of these structures as a pedicle so fashioned as to permit the change in position to be effected with perfect ease and without tension on the nutrient tissues. This method of dealing with non-union by using a pedicled bone graft is recognised as an accepted procedure, and a more or less detailed description will be found in books dealing with the treatment of maxillofacial injuries.

RESULTS

The numerous cases arising from injury during the last war and operated on by me and my American collaborators, both in this country and in America, showed a high percentage of absolute successes. I was able to exhibit three such cases to the odontological section of the Royal Society of Medicine some twenty years after operation (Cole 1938). The test of time has dispelled the gloomy forebodings of professional criticism.

In a recent book on plastic surgery by Barsky (1938) it is alleged that "there is a possibility of functional disability caused by the restriction of the movements of the tongue and muscles of the floor of the mouth." In his description of the operation the pedicle is said to consist "of the platysma muscle below and the muscular attachments of the floor of the mouth internally." If this internal attachment existed, resulting dysfunction would at least be credible, but technically and anatomically it does not. In the numerous cases dealt with functional disability of any kind has not been met with. In the present case a period of 3¼ years has elapsed since the operation; the radiographic appearances are shown in fig. 3. No flattening at the site of removal of the bone from the mandible could be observed in the facial contour, and protrusion of the tongue was free and unfettered. Further, to clinch the question of functional ability, the patient has followed his calling as a sailor and has eaten the food provided on board ship with ease and comfort locally and without digestive disturbance.

Although it is true that non-union may result from loss of bone no matter how occasioned, it is equally true that it is a rare consequence of sequestration resulting from an osteomyelitis set up by infection alone. I have previously discussed (Cole 1926) the sequelæ of infection in the mandible and emphasised the importance of splinting in acute cases where

FIG. 2—Radiogram showing the graft immediately after the operation.

FIG. 3—Radiogram showing the graft 3¼ years later.

spontaneous fracture may be expected. Illness arising from such an infection lasted in this case for nearly two years, during which time the patient was unable to follow his occupation, was subjected to several operations, and suffered considerable inconvenience and pain. Once fracture has taken place the resulting mobility will not only tend to prolong and extend the infective process but also may prevent the maintenance or renewal of continuity by regenerated bone. No claim to novelty is made for the treatment adopted. The result is recorded to show how, once initiated, union is strengthened and consolidated; thus to vindicate the pedicled bone graft as a sound and reliable procedure; and to challenge with facts the hypothetical disadvantages alleged to attend its employment.

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MISSED ABORTION AND MISSED LABOUR

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ASSISTANT SURGEON TO THE LIVERPOOL MATERNITY HOSPITAL AND TO THE WOMEN'S HOSPITAL, LIVERPOOL; GYNÆCOLOGICAL TUTOR IN THE UNIVERSITY OF LIVERPOOL

IN 1935 Robinson et al. reported a new method for evacuating the uterus in missed abortion and in missed labour by increasing the sensitivity of the uterus with œstrogens. Further experience of this treatment has since been obtained, and it is now possible to report the details of 55 consecutive cases, including the 12 previously described.

Intra-uterine death of the fœtus is usually followed by expulsive uterine contractions within a comparatively short time. Sometimes, however, the fœtus, though dead, is retained in utero for weeks or years. The condition is then termed missed abortion or missed labour according to the period of pregnancy at which the fœtus dies. In these cases there must be some failure in the mechanism which ordinarily initiates the expulsive uterine contractions, and study of them may throw light on the cause of the onset of normal labour—a phenomenon still incompletely explained. Frank et al. (1933) were the first to show that intra-uterine death of the fœtus is accompanied by a fall in the amount of "free" œstrogens in the blood-stream. They suggest that, if less than one mouse unit of œstrogen is demonstrable in 40 c.cm. of blood of a pregnant woman, the finding is diagnostic of intra-uterine death of the fœtus. This work was confirmed in the laboratory of the department of

obstetrics and gynæcology in the university of Liverpool by Polonsky (1936) and myself, using the technique of Frank et al. (1933). The test was carried out on 82 patients, in most instances at the request of the clinician, who suspected the death of the fœtus. All the patients were subsequently traced, and the results are shown in table I. These findings show

TABLE I—BLOOD-ŒSTROGEN TESTS

Blood œstrogen	Fœtus alive	Fœtus dead	Incorrect results
Free œstrogen in 40 c.cm. of blood	46	3	3
No free œstrogen in 40 c.cm. of blood (less than one mouse unit)	3	29	3
Test animal died	—	1	—

that, when used to diagnose fœtal death, the test, in our hands, is accompanied by appreciable error. Nevertheless, they serve to demonstrate that the amount of œstrogens in the blood is usually reduced when the fœtus dies but remains in utero.

The question arises whether this change is associated directly with the death of the fœtus or is the result of failure of placental function. The answer to this question is supplied by investigation of the œstrogen content of the blood in cases of hydatidiform mole, when the fœtus is dead but chorionic activity persists. This investigation was carried out in 3 cases, and large amounts of "free" œstrogen in the blood were easily demonstrable in all. This means that the change in the œstrogen content of the blood depends on an alteration in placental function rather than on the death of the fœtus. This is in keeping with the accepted view that it is the placenta which is responsible for the production of œstrogen, and indeed progesterone, during the greater part of pregnancy. In view of the activating effect of œstrogens on uterine muscle, it is possible that the unusually small amounts of this hormone in circulation largely explain the quiescence of the uterus in missed abortion. On the other hand, this quantitative hormonal change may be merely coincidental and the inevitable result of death of the placenta. Whatever the explanation may be, the results described here show that, if the deficiency of œstrogens is rectified by prolonged administration of any type of œstrogenic substance, the uterus becomes sufficiently active to expel its contents.

METHOD

In treating missed abortion or missed labour, the object is to increase the sensitivity and activity of the uterine muscle. To this end œstrogens are administered at short intervals for several days. As a result the uterus becomes so sensitive that expulsive uterine contractions may begin without any further medication. If not, however, the uterus, already prepared by œstrogens, will react readily to oxytocic agents, such as quinine and posterior-pituitary extract, whereas it rarely reacts to these substances without previous sensitisation. The technique was varied from time to time, and different œstrogens were employed. In the earlier cases œstrone or œstrone benzoate was used, and at that time standardisation of the preparations was unsatisfactory. In table II an endeavour has been made to convert the mouse and international units of earlier preparations to the modern milligramme unit, and the dose stated is probably only approximately correct. In tables III and IV, however, the dosage of œstradiol benzoate and stilbœstrol is according to the manufacturer's specifications. After trial of various techniques of treatment, the following is employed at present. Œstradiol benzoate is given intramuscularly in a dose of 2 mg. every eight hours for seven or eight days. If abortion has not taken place by the fifth day, quinine hydrochloride gr. 10 is given each hour for three doses and followed by four injections of 0·5 c.cm. of posterior-pituitary extract at intervals of an hour. This treatment is repeated on the eighth day if the products of conception still remain in the uterus. When stilbœstrol is used instead of œstradiol benzoate, 2 mg. is given by mouth thrice daily, or 1 mg. four-hourly, for seven or eight days. The quinine and pituitary extract are also given when required on the fifth and eighth days.

RESULTS

A total of 55 patients were treated: 14 with œstrone or œstrone benzoate, 30 with œstradiol benzoate, and 11 with stilbœstrol. In 48 cases the uterus was evacuated weeks or even months after the death of the fœtus. There was some doubt about one of these cases for the cervix was dilated and the lower segment packed twenty-four hours before œstrogen was given. There were, however, no signs of abortion before the administration of the hormone, and the uterus was not evacuated until five days after the operation. In a few other cases the possibility of spontaneous onset of labour cannot be excluded, for expulsive uterine contractions began so quickly after relatively few doses of œstrogen that it is doubtful whether the two events should be regarded as cause and effect. In 29 of the successful cases nothing but œstrogen was administered, but in the remainder oxytocic drugs were given on the fifth to the eighth days of treatment. However, these drugs rarely, by themselves, cause abortion or labour in these cases, and it seems permissible to conclude that the œstrogenic hormone, by sensitising the uterus to respond to oxytocic agents, was the main cause of evacuation of the uterus. Hormone induction failed in 7 cases, but failures have become fewer as experience of the method has been acquired. Thus, there was only one failure in the last 27 cases. Of the 7 failures 5 patients experienced "pains" and uterine hæmorrhage (previously absent) as a result of treatment, but evidently uterine sensitivity was not sufficiently increased to complete the abortion. In a sixth case subsequent attempts to induce abortion with an intra-uterine bag also failed, and vaginal hysterotomy was finally necessary; the uterus in this case must have been unduly inactive. In the seventh unsuccessful case a lack of œstrogens in the blood could not be demonstrated before treatment was begun.

Further inquiry into these results reveals that the ease with which hormone induction may be brought about varies directly with the duration of pregnancy before the death of the fœtus—i.e., the size of the uterus—and inversely with the length of time during which the products of conception have been dead. A fœtus of considerable size which has died recently is more easily evacuated. Thus, in 29 patients the uterus was of the size of a twenty-eight weeks pregnancy or over. Induction of labour was successful in 28 of these, and in only 9 were accessory uterine stimulants necessary. In 26 cases the uterus was less than twenty-eight weeks in size; induction was successful in 20 of these, œstrogens alone, without oxytocic drugs, being used in 9.

All of the œstrogenic substances used appear equally efficacious, although relatively larger amounts of œstrone and œstrone benzoate are required. All the later cases were treated with stilbœstrol given by mouth. This synthetic œstrogen gives equally good results, and so far there have been no failures with it in 11 cases. It has the distinct advantage that it avoids the necessity for repeated intramuscular injections.

DISCUSSION

The advantages of a medical method of treating missed abortion and missed labour are considerable. Surgical interference, in the presence of an inert uterus and macerated products of conception, is always attended by risk of hæmorrhage, injury, and infection. In the cases described here every patient successfully treated with œstrogenic hormone had an uneventful apyrexial convalescence, and extrusion of the uterine contents was usually rapid, complete, and unaccompanied by abnormal hæmorrhage. In one

case the delivery of the placenta was delayed for a few hours, but there was no bleeding, and it was subsequently expressed with ease. One other patient is recorded as having had slight postpartum hæmorrhage, which was also easily controlled by fundal massage and with ergot. In the remainder abortion or labour was characterised by the absence of any delay or difficulty.

It has been realised for some years that it is rarely, if ever, possible to promote abortion in women with œstrogens if the fœtus is alive and well established. It is, therefore, difficult to avoid speculation about why the death of its contents alters the response of the uterus to œstrogenic hormone. During normal pregnancy there is a balance between inhibiting and activating hormones—progesterone and œstrogens—progesterone being dominant in its effect on uterine muscle. This balance is qualitative rather than quantitative, and it is difficult, if not impossible, to override the effect of progesterone by the administration of even the largest amounts of œstrogens. It may well be that any œstrogens given are inactivated

TABLE II—ŒSTRONE AND ŒSTRONE BENZOATE

Age	Parity	Duration of pregnancy (weeks)	Approx. time since death of fœtus	Total amount of hormone given (mg.)	Duration of hormone treatment	Additional treatment	Time of abortion (hours)*	Result	Comments
34	2	35	20 weeks	490	7 days	Quin. & pit. 4th day and 8th day	198	Success	—
38	7	32	18 ,,	10	3 ,,	..	192	,,	—
26	2	26	15 ,,	303	6 ,,	Quin. & pit. 4th day, pit. 7th day	172	,,	Negative blood œstrogen test.
25	?	28	15 ,,	320	5 ,,	Pit. 4th day, quin. & pit. 7th day	..	Failure	Pain and bleeding at 100 hours, negative blood œstrogen test.
39	4	28	12 ,,	10	3 ,,	..	72	Success	Dilatation of cervix, quinine on 2 previous occasions had failed.
22	4	32	10 ,,	420	7 ,,	Quin. & pit. 7th day	180	,,	—
23	0	35	9 ,,	160	3 ,,	..	66	,,	Negative blood œstrogen test.
32	0	33	8 ,,	140	4 ,,	..	80	,,	..
31	2	28	6 ,,	12	3 ,,	Quin. & pit. 4th day	100	,,	Malaria treated with quinine killed fœtus
?	2	33	5 ,,	10	1 dose only	..	3	,,	Negative blood œstrogen test.
20	0	31	3 ,,	4	2 days	Ol. ric. 5th day	138	,,	Twins, eclampsia, negative blood œstrogen test.
29	2	34	2 ,,	340	6 ,,	..	168	,,	Mitral stenosis, negative blood œstrogen test.
20	0	32	2 ,,	300	5 ,,	Pit. 5th day	144	,,	—
23	?	35	4 days	200	5 ,,	Pit. 3rd day, ol. ric. 4th day	100	,,	—

* Time counted from first dose of œstrogens.

TABLE III—ŒSTRADIOL BENZOATE

25	0	32	18 weeks	18	3 days	Quin. & pit. 1st day and 3rd day	80	? Success	Dilatation of cervix and pack 24 hours before œstrin
31	0	30	16 ,,	96	8 ,,	Quin. & pit. 6th day, ergometrine	200	Success	Anencephalus, meningocele, negative blood œstrogen test
?	0	36	12 ,,	76	7 ,,	Pit. with each injection	144	,,	—
36	4	24	12 ,,	92	8 ,,	Quin. & pit. 5th day	..	Failure	Show and pain at 100 hours
28	2	28	12 ,,	104	9 ,,	Quin. & pit. 5th day	..	,,	Show and pain.
25	0	40	12 ,,	42	4 ,,	Quin. & pit.	72	Success	—
35	4	21	11 ,,	64	10 ,,	Quin. & pit. 5th day and 7th day	..	Failure	Positive blood œstrogen test.
23	?	20	10 ,,	174	10 ,,	Pit.	..	,,	Taylor's bag also failed.
41	6	36	10 ,,	20	3 ,,	..	50	Success	Toxæmia
?	1 ab	25	7 ,,	20	3 ,,	Quin. & pit. 4th day	..	Failure	Bleeding at 100 hours.
40	9	32	6 ,,	12	1 day	..	15	Success	Slight postpartum hæmorrhage.
30	1	34	6 ,,	48	4 days	..	90	,,	Negative blood œstrogen test
28	1	34	6 ,,	80	7 ,,	Ol. ric., quin. 8th day	220	,,	Toxæmia, negative blood œstrogen test
35	2	34	5 ,,	52	5 ,,	..	96	,,	Toxæmia, negative blood œstrogen test
34	0	40	5 ,,	46	7 ,,	Quin. & pit. 7th day	168	,,	—
29	?	24	4 ,,	20	2 ,,	..	36	,,	Negative blood œstrogen test.
32	0	42	4 ,,	4	one injection	..	Immediate	,,	Toxæmia
37	5	32	3 ,,	40	2 days	..	40	,,	—
36	0	38	2 ,,	12	2 ,,	..	36	,,	Toxæmia
35	0	34	2 ,,	80	7 ,,	Quin. 6th day	148	,,	Toxæmia, positive blood œstrogen test
40	8	?40	2 ,,	6	2 ,,	..	36	,,	General ill health
23	0	35	1 week	24	2 ,,	..	48	,,	Toxæmia
24	0	38	1 ,,	10	1 day	..	4	,,	—
32	0	38	1 ,,	16	1 ,,	..	5	,,	Toxæmia
27	1	38	1 ,,	80	7 days	Quin. 6th day	148	,,	Previous quin. induction killed fœtus
33	2	34	1 ,,	24	2 ,,	..	36	,,	—
37	0	33	1 ,,	6	1 day	..	24	,,	Toxæmia
35	3	?39	3–4 days	64	6 days	Quin. & pit.	120	,,	Diabetes, negative blood œstrogen test
?	1	39	3–4 ,,	4	1 day	..	10	,,	Placenta prævia
40	6	33	3–4 ,,	84	7 days	Quin. & pit. 5th day	336	Failure	Toxæmia and valvular disease of the heart; pains on 7th day but passed off; onset of labour too late to be regarded as successfully induced

* Time counted from first dose of œstrogens.

TABLE IV—STILBŒSTROL

38	12	34	14 weeks	105	7 days	Quin. & pit. 5th day	144	Success	—
26	1	23	13 ,,	18	6 ,,	Quin. & pit. 5th day	144	,,	—
34	4	27	12 ,,	8	2 ,,	..	50	,,	Cervical polyp.
26	4	29	11 ,,	105	7 ,,	Quin. & pit. 5th day	144	,,	—
32	1	32	6 ,,	45	5 ,,	Quin. 4th day	120	,,	—
24	0	37	2 ,,	90	6 ,,	Quin. & pit. 5th day	144	,,	—
33	2	37	1 ,,	24	2 ,,	..	48	,,	Diabetes
42	0	41	1 ,,	55	..	..	54	,,	Placenta retained for a few hours, no bleeding
24	0	36	1 ,,	30	2 days	..	36	,,	Toxæmia
40	6	30	?	40	1 day	..	10	,,	—
24	0	40	3–4 days	80	6 days	..	144	,,	Hydrocephalus

* Time counted from first dose of œstrogens.

in the blood-stream by some mechanism operating during pregnancy. Nevertheless, when the products of conception die, the placenta ceases to produce not only œstrogens but also progesterone. This conjecture is substantiated by the recent work of Browne et al. (1939), who found a gross fall in the output of pregnandiol in missed abortion. The uterus then is released from the all-powerful influence of progesterone and can react to œstrogens by expelling the dead products of conception. Hormone induction of abortion or labour when the fœtus is dead is therefore possible in a large percentage of cases; the technique is easy and the subsequent evacuation of the uterus unattended by complications. The results justify the adoption of this method as the standard treatment in these cases.

SUMMARY

(1) Intra-uterine death of the products of conception is followed by a decrease in the amount of œstrogens in the blood-stream. Administration of œstrogens to patients with missed abortion and missed labour so increases the sensitivity of the uterus that its evacuation is usually promoted.

(2) The method of induction described here was successful in 48 out of 55 consecutive cases. Expulsion of the products of conception was free from complications such as uterine hæmorrhage and infection.

(3) The rationale of the use of œstrogens in these cases is discussed. The routine adoption of this medicinal method of induction should make surgical intervention, with its attendant risks, rarely necessary.

The following proprietary œstrogenic preparations were used: Œstroform, Œstroform B. (British Drug Houses), Progynon B. (Scherings), Dimenformone (Organon), Stilbœstrol (British Drug Houses), Syntestrin (Gedeon Richter). I am indebted to these firms for their various products, which were supplied free or at reduced cost. Most of the patients were treated in the Liverpool Maternity and Women's Hospitals, and I am grateful to colleagues on the staffs of these hospitals for permission to direct the treatment and to record the results.

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RADIUM AND RADON

BIOLOGICAL REACTIONS COMPARED

BY S. RUSS AND G. M. SCOTT

(*From the Barnato Joel Laboratories at the Middlesex Hospital, London*)

THOSE who have consistently used radium in treatment are apt to question how far it is possible to substitute radon for radium, in view of the significant change in strength of radon with the length of treatment. This question became important last September, when radium all over the country was put into safe custody; radon quickly became available, but no doubt some have refrained from using it because of uncertainty about how far it can take the place of radium.

In 1932 we investigated the action of radium on the ovary of the rabbit,[1] and it now seemed worth while to repeat the experiments with radon. These experiments could be duplicated only in the sense that equal physical doses of radiation could be given. This can be done in one of two ways: either the initial quantity of radon can be increased, according to the equation

$$Q_o\,(1-e^{-\lambda t}) = \lambda Qt,$$

where Q is the number of milligrammes of radium, Q_o the number of millicuries of radon, and $\lambda = 0{\cdot}18$ day^{-1}, the length of treatment (t) being kept the same; or the time of treatment may be extended to T, the quantity Q being kept the same, according to the equation

$$Q\,(1-e^{-\lambda T}) = \lambda Qt.$$

We chose prolonging the time of treatment to compensate for the decline in the strength of the radon rather than increasing the initial strength of the source.

The initial strength of the radon source was 6 millicuries, and it was left in situ for 11·1 days, the corresponding interval with 6 mg. of radium element being 4·8 days. So the question narrows down to whether there is any significant change in the reactions of the ovary of the rabbit when irradiated with radium and with radon, the initial sources being of the same strength but the time of exposure lengthened from 4·8 to 11·1 days. (The Paris technique for the treatment of cervical cancer with radium extends over 5 days.) Complete details of the technique adopted need hardly be given here; it is enough to say that radon in platinum tubes was stitched on either side of a rabbit's ovary and removed after 11·1 days. The rabbit was allowed to live for another six weeks; it was then killed, and the ovaries were removed for examination. In two rabbits the radiation was screened by 0·6 mm. of platinum; in a third the screenage was 0·3 mm. of platinum.

The sections prepared showed that extensive damage had been done to the irradiated ovaries. In the rabbits in which 0·6 mm. platinum screens were used, the extent and degree of this damage could not be distinguished from that produced by the same dose of radium with the same screen. When the screen was 0·3 mm., the resulting damage appeared to be rather greater than that caused by radium under the same conditions; it is likely that this difference in the effects produced by radon and by radium is due to the extra degree of screening brought about by the radium itself inside the platinum container. A radium salt within a platinum tube is a little more screened than a radon source inside a similar tube.

SUMMARY

Experiments previously carried out on the action of radium on the rabbit's ovary were repeated with radon. On the whole the effects produced were remarkably similar.

1. Russ, S. and Scott, G. M. *Brit. J. Radiol.* 1932, **5**, 814.

The Lancet 100 Years Ago

June 6, 1840, *p.* 371.

From the evidence of Sir Richard Dobson *before a Royal Commission:*

Do you think it would be of great advantage to the service, if, instead of calling those gentlemen physicians, they were called surgeons of the fleet?—Most unquestionably, because, after a battle, those gentlemen who are physicians of the fleet will not use any instrument, and never do. As the thing is at present, a physician to the fleet has his right hand tied behind his back, it being incompatible with his title to operate. . . . Without meaning the slightest disrespect to any man on the list of physicians, I can say that if there be any blockheads amongst the surgeons of the navy there is not one who is so great a blockhead as to think himself not perfectly well qualified for the duties of a physician; but when physicians would have the operations of an hospital to perform they would rather feel their disqualification. I am of opinion that a hospital surgeon ought to be higher paid than a physician, inasmuch as his duties are more laborious, and neither less difficult nor requiring inferior qualifications. At all events, if a surgeon blunder, it is seen; a physician may prescribe wrong, but there is no testimony of it.

In consequence of the evidence of Sir R. DOBSON, and of other witnesses, the commission have recommended "that the rank of physician should be abolished in the naval service."

REVIEWS OF BOOKS

On Oxidation, Fermentation, Vitamins, Health and Disease

By ALBERT V. SZENT-GYÖRGYI, M.D., Ph.D., Prix Nobel, professor of medical and organic chemistry, University of Szeged. London: Baillière, Tindall and Cox. 1939. Pp. 109. 11*s*.

THESE five Abraham Flexner lectures will make absorbing reading for the research worker, the medical man, the student or the intelligent layman. Much of the charm of the spoken word is maintained and the pages are enlivened by the author's whimsical humour. Professor Szent-Györgyi is a man of vision; not befogged by a mass of intricate details, he can see through and beyond them to fundamental concepts and can glimpse something of the true pattern of that state we call "life." For this reason the first and last lectures are the most stimulating and enjoyable. In the first we are led easily and gently but competently to the underlying principles of biological oxidation. The life of the cell (and thus of the whole body) is not a question of oxygen but of hydrogen. "Life knows but one fuel, H, which is the great fuel of life." How this is so, the story of the transfer of hydrogen from substance to substance, and the meaning of this in terms of energy, are explained with admirable lucidity. The final lecture on vitamins, health and disease is an example both of the simplicity and the daringness of your man of vision and contains much wisdom. The most difficult lecture is the second, on the respiration of muscle. Here the author, starting at the end of the story (oxygen) works backwards, seeking to follow the steps taken by hydrogen in its amazing journeyings. A great deal of this concerns work by the author himself and his colleagues; evidence is accumulating that the sequence worked out by them probably pictures the actual facts. A simple additional diagram might have helped.

The section most open to criticism is probably that on the oxidation and resynthesis of lactic acid. Here we are not told that in mammalian muscle no evidence has yet been obtained that lactic acid is resynthesised to glycogen except via the liver (Cori cycle). For this and other reasons it is difficult at present to accept the attractive suggestion that a third of each molecule of lactic acid is oxidised (rather than a third of the number of molecules) and the rest converted to a biose which can be polymerised to a hexose. The lecture on vegetable oxidation systems, with the frequent references in other parts of the book to the underlying unity of plant and animal life, is particularly welcome. This should be a sufficient reply to those students who resent being taught any facts of plant physiology on the score that they are a waste of time.

It is a pity that the book is so expensive, for it should be widely read. Those who do read it will undoubtedly enjoy it.

Poisons: Their Isolation and Identification

By FRANK BAMFORD, B.Sc., late director of the Medico-Legal Laboratory, Cairo. London: J. and A. Churchill. 1940. Pp. 344. 18*s*.

THERE is an evident need for a short book by a practical toxicologist to bridge the gap between the appendices of textbooks of forensic medicine and the comprehensive Autenrieth's "Detection of Poisons." This is what Bamford has set out to supply and he has contrived to catalogue the laboratory tests for the identification of poisons in a way that makes arresting reading. The approach is strictly practical, the text being packed with valuable tips and asides, and a sound balance is struck between theory and bench work. The book is comprehensive enough for all ordinary purposes, and includes a small masterpiece on the isolation and identification of the alkaloids. Sections on toxalbumins, poisonous plants, the sulphonamides and fur dyes are added, together with a chapter on the drugs of addiction. Here and in other chapters one finds evidence of the limitations of practice in Cairo—Bamford confesses to never having seen a fatal case of aspirin poisoning. He is wise enough, however, to describe in detail many recently described tests he thinks worth trying with their references at the foot of the page. Every analyst has his own fancies in analytical method, and it would be unfair to criticise Bamford's likings, for he provides plenty of alternatives. What is most remarkable is the absence of errors in a book so packed with figures.

This is an attractive laboratory manual whose pages will be well thumbed by many a chemist as well as the professional forensic analyst.

Physiological Basis of Medical Practice

(2nd ed.) By C. H. BEST, M.D., D.Sc. Lond., F.R.S., professor and head of the department of physiology in the University of Toronto; and N. B. TAYLOR, M.D., F.R.S., professor of physiology in the university. London: Baillière, Tindall and Cox. 1939. Pp. 1872. 55*s*.

THIS book requires no introduction. The most striking change in the second edition is the inclusion of an entirely new section on the special senses. This makes the whole a more complete textbook of physiology but the reader gets the impression that the authors have not brought quite the same enthusiasm to bear on this section as on the original parts of the book. The chapters on the eye contain the information of an orthodox textbook of physiology and retain an undue number of the so-called "laws"—theories and formulæ which have a very limited application even in the laboratory. The section on the ear contains a good account of cochlear potentials and an impartial presentation of the evidence for the telephone and resonance theories. Taste and smell receive adequate attention. The whole section is written in lucid style but some of the terminology—e.g., extensity, dendate, entoptic—is a little strange to readers in this country. The original sections have been revised without any disturbance of their arrangement and most of the alterations are limited to sentences or short paragraphs, with the result that the number of pages is almost unchanged.

Compendium of Regional Diagnosis in Lesions of the Brain and Spinal Cord

(11th ed.) By ROBERT BING, professor of neurology, University of Basel, Switzerland. London: Henry Kimpton. 1940. Pp. 292. 25*s*.

Professor Bing's *Kompendium* is well known in its original form in this country, but this translation by Professor Haymaker will greatly extend its public. Although it is not a book of exact neuroanatomy or detailed neurophysiology the localisation of lesions in the nervous system is approached through the medium of anatomy and physiology. The application of these exact sciences to clinical neurology calls for selection and interpretation which lay the author open to the censure of the purist. But the book is not intended for the critical expert; it is written to introduce clinical neurology to the student, who in the past has been deterred by the German text. Professor Hay-

maker has made a free translation and by altering the structure of some parts of the book has made it extremely readable; even such difficult sections as that on the aphasias are lucid. Only the section on radiography seems inadequate and ill-balanced. The layout, clearly-marked diagrams and the absence of references make for simplicity, and the use of tabulation and varying size of type makes selection easy.

Statistical Methods for Medical and Biological Students

By GUNNAR DAHLBERG, M.D., LL.D., professor at the University of Uppsala; head of the Swedish State Institute for Human Genetics and Race Biology. London: George Allen and Unwin. 1940. Pp. 232. 10*s.* 6*d.*

MOST authors of textbooks or papers dealing with statistical methods in medicine open with the expression of a belief that the average medical worker has little knowledge, and less love, of mathematics, and affirm that if he will go with them he shall not be disturbed. The premise is certainly reasonable; the promise, with rare exceptions, is not kept. It is all a question of degree. What seems so easy and non-mathematical to the expert is nothing of the sort to many a poor ignorant reader. Professor Dahlberg is no exception. The algebra he finds it necessary to introduce is not difficult but the symbolism is there and makes it look as if it were—and often that is quite enough for those who are shy of such signs. The introduction, too, without explanation of such terms as exponential function and parameter is not encouraging to the beginner. In describing the line of thought behind statistical methods Dr. Dahlberg is on happier, but rather dull, ground; possibly his book has lost in the translating. In general this "attempt at a compromise between the demands of the mathematical statistician and the mathematical limitations of the medical and biological student" has not been very successful. The more advanced medical student is already well provided and would gain little more here, the average doctor would certainly find it difficult and probably uninspiring.

Cardiovascular-renal Disease

A Clinicopathologic Correlation Study Emphasising the Importance of Ophthalmoscopy. By LAWRENCE W. SMITH, M.D., professor of pathology; EDWARD WEISS, M.D., professor of clinical medicine; WALTER I. LILLIE, M.D., professor of ophthalmology; FRANK W. KONZELMANN, M.D., professor of clinical pathology; and EDWIN S. GAULT, M.D., associate professor of pathology; all of Temple University school of medicine. London: D. Appleton-Century Company. 1940. Pp. 227. 20*s.*

THIS most readable monograph, based on the material awarded the Frank Billings gold medal at the Scientific Exhibition of the American Medical Association in 1938, is a laudable attempt to clarify the present state of our knowledge about cardiovascular-renal disease. Dealing in turn with essential hypertension, senile atherosclerosis, nephritis and nephrosis (this last heading, rather curiously, including the toxæmias of pregnancy and pyelonephritis), it gives a clear outline of present views on pathogenesis and clinical and pathological features, each condition being illustrated by one or two well-documented case-reports. Particular attention is paid throughout to the ophthalmological findings. The process of simplification has led to certain as yet unjustified assumptions. There is a tendency to ascribe more importance to the renal factor in essential hypertension than seems to be warranted, while the status of malignant hypertension as outlined by the authors is far from satisfactory, and even such an authoritative monograph as this cannot be quite up to date; for instance, on the question of the relationship of the suprarenals to the hypertension of experimental renal ischæmia.

Food Control: its Public Health Aspects

By JAMES HOUSTON SCHRADER, Ph.D., formerly director, bureau of chemistry and food, Baltimore Health Department; instructor in biochemistry, Johns Hopkins University. London: Chapman and Hall. 1939. Pp. 513. 24*s.*

THE aim of this book is to give the reader a broad comprehension of why food control is necessary, what industrial practices are concerned in such control and how control measures are applied. On the whole it has succeeded, but the subject is so wide that no one section can be comprehensive in full detail. The various foods are considered separately, and so are the different types of preservation, such as canning, refrigeration and drying. Each subject is discussed on a definite plan—technology, relation to public health, including nutritional value, dietary importance, bacteriology, sources of infection and epidemiology, and measures of control. The control measures are confined to those adopted and legal in the United States, so also are the various bacteriological methods and standards. The literature quoted is largely confined to work done in that country and a good deal of valuable work done in Great Britain and on the Continent is ignored. For example, no mention is made of the long investigations carried out year by year by the English Food Investigation Board.

The book is up to date and on the whole accurate, but it may be said that the definition of food-poisoning given would exclude outbreaks due to living salmonella organisms; botulism and diphtheria are never carried by water, not "rarely" as stated; to use as small an amount as 1 millilitre of pasteurised milk in expressing the *B. coli* content is rather absurd, and the maximum limit for tin in foods is not 2 grains per pound in England, since there is no limit fixed. Nevertheless, for those who need a wide survey of food control and its dangers the book can be strongly recommended. It is well printed and written in a clear and unambiguous way.

Cancer in Childhood

Edited by HAROLD W. DARGEON, M.D., F.A.A.P., instructor in pediatrics, College of Physicians and Surgeons, Columbia University. London: Henry Kimpton. 1940. Pp. 114. 15*s.*

THIS depressing book, compiled by Dr. Dargeon with the help of ten colleagues, deals with malignant disease in the young but also touches on certain benign tumours and mentions the leukæmias and certain types of nævus. Most of the articles have already been published in the *Journal of Pediatrics*, and Dr. James Ewing contributes a valuable critical review as an introduction. It comes as a shock to learn that in 1936 malignant disease caused more deaths in New York city in children than whooping-cough and nearly as many as scarlet fever. Some of the contributions are inferior in quality. What is the evidence for this statement, for example? "Although malignant tumours of the penis do not occur in children, precancerous changes undoubtedly take place before the age of 10 years in a certain proportion of boys who have tight prepuces." From this it is argued that "complete protection" can only be provided by early circumcision.

For reference purposes this symposium probably fills a gap and we learn that a legacy will make it possible to distribute free copies to certain libraries.

THE LANCET

LONDON: SATURDAY, JUNE 8, 1940

THE INJURED WORKMAN

In the case of Donoghue *v.* Stevenson (1932) Lord ATKIN said, "I do not think so ill of our jurisprudence as to suppose that its principles are so remote from the needs of a civilised society as to deny a legal remedy where there is so obviously a social wrong." The social conscience is becoming increasingly sensitive to the spectacle of an industrial worker disabled by accident at his work; we can no longer treat such incidents as the private concern of the workman and his employer. For some time past the legislatures of civilised states have attempted to devise means whereby the injured worker can secure relief, but there is still an infinite variety in the kind of relief offered and the means of obtaining it. In this country Parliament began to intervene in 1882, and in 1897 the first Workmen's Compensation Act was put on the statute book. Many amending acts have since been passed, and there have been Government inquiries, notably that conducted by HOLMAN GREGORY with its comprehensive report of 1920 in which it was recommended that insurance against employers' liability should be compulsory, that the administration of the various acts should be vested in a commissioner with local representatives, that the employer should be made liable for the costs of treatment, that inquiry should be made into arrangements for training partially disabled men for suitable work, and that registrars of county courts should be given authority to advise injured workmen about their rights. None of these proposals has been adopted, except to a limited extent and in the face of bitter opposition. Now at last we have a Royal Commission sitting, with wide terms of reference, to advise on the arrangements for dealing with industrial accidents, including industrial disease; the hearing of evidence began in February, 1939, and although the sittings of the commission were suspended at the outbreak of the present war, they were later resumed. Government departments have provided valuable data; representatives of employers, workmen, insurance companies, and public-utility bodies have given their views; the experience of France, Germany, and the United States has been put in: the Royal College of Surgeons of England has a member of its council on the commission; the Royal College of Physicians of London has tendered evidence prepared by a committee of experts; others have spoken on behalf of hospitals and medical societies having special contacts with problems of industrial medicine.

It is possible to trace certain trends of thought in the published evidence which already covers over a thousand foolscap pages. The injured workman cannot be left to get what he can out of his employer; his restoration in mind, body and estate concerns the community at large and is as much a social service as is health insurance, unemployment assistance, or any other scheme for the relief of destitution and loss of earning capacity. There is obviously a strong demand for more state control, for an increase in the rates of benefit, and for protection of the workman against the insolvency of his employer. Equally obvious is the dissatisfaction with the present system of allowing disputes on medical questions to be settled by a single medical referee from whose decision there is no appeal, or by taking such cases to court. Approval has been given to the simple informal procedure of the Unemployment Assistance Board in adjusting claims. The College of Physicians has reasonably pleaded that purely medical issues should be settled by medical machinery. Each county court should have its medical board presided over by a part-time local consultant well versed in local industrial conditions. The board would receive medical reports, examine the workman and submit its opinion in writing to the judge. There would then be no devastating conflict of medical opinion in open court and no lengthy litigation to keep the workman's mind on edge. And the physicians' evidence dealt too with the all-important question of rehabilitation. No-one is content with the present facilities for treatment; one side of the question has been well ventilated in a recent report on the handling of fractures. There are, it is true, rehabilitation centres in certain districts but any statesmanlike scheme to restore the workman to full working capacity implies coöperation everywhere between the factory, the panel practitioner, the hospital and the rehabilitation centre. After many injuries the general condition of the patient deteriorates while he is in hospital; without special treatment in the form of suitable medical exercises or of light work under supervision he will not regain his normal working capacity. A wide scheme of social service is essential to guide the workman and assist in the coördination of his treatment.

Payment of a lump sum by way of compensation for an injury has come in for criticism; although such payments are popular with employer, workmen and insurance companies, experience has shown that they seldom confer any lasting benefit on the recipient and are often quite inadequate to meet the needs of a man who is permanently disabled. Trade-unions are emphatic that compensation should be a charge on the employer alone and that the workman in particular should not be asked to contribute; against this view is the full weight of national health insurance, in which the funds are provided by small weekly payments from employer, workman and state. In their evidence WILSON and LEVY, extending their published study of 1939, showed that the incidence of industrial accidents varies only within narrow limits from year to year and may fairly be classed as a risk

suitable to be covered by a fixed rate of insurance. Time presses and the situation seemed so urgent in one direction that the Government brought in a bill to grant supplementary allowances for meeting cases of hardship; but although the scales were drawn up after discussion with representatives of industry the bill had a stormy reception in the House of Commons. One crumb of comfort is the likelihood that the pecuniary rate of compensation will soon be raised by one third. Another is that the Royal Commission, which had again postponed its labours, is to resume its sessions on June 20, and it is right that no effort should be spared to eliminate that most tragic of all kinds of waste—the relegation to the scrap-heap of a man who has fallen victim to the ever-increasing peril of the industrial machine but who can be restored, not by litigation but by perseverance, to his place in the body politic. The last few weeks have seen many a short cut to efficiency in national affairs. Industrial rehabilitation would be a not unworthy task for a Minister of State with plenary powers.

THE SURGICAL LESSONS OF HEAVY FIGHTING

THE basic principles of war surgery are simple, but their application must depend on circumstances. Excision, drainage and immobilisation are the basis of all wound treatment, but excision is properly limited to wounds seen before infection is established, and is highly dangerous once the inflammatory reaction of the tissues has been set in train. The application of these principles will vary in detail with the number and condition of the wounded, the nature of the battlefield, the adequacy of transport, and the experience and equipment of the medical services. During the quiet intervals of stationary warfare the majority of wounds will be excised while they are still uninfected. A proportion of these will be sewn up and kept at the casualty clearing station till they are healed. The after-treatment, particularly with regard to whether splinting is adopted or not and the method employed, will be adapted to the needs of the case with the aim of attaining the best restoration of function at the earliest time. In heavy fighting with movement, particularly when all communications are harassed by enemy activity and strained to their limits, the wounded will arrive in large numbers, dirty, tired, hungry and thirsty, often several days after they were hit. The aim of surgery then is to treat the maximum number of men with the one object of saving life and limb, and ensuring their safe transport afterwards with the minimum of attention. Under such conditions the method of wide drainage and fixation in plaster-of-paris is supreme. "The one advantage of plaster over any other method of fixation, and in certain circumstances it is an overwhelming one, is that it is fool-proof. Once a wounded man has undergone efficient surgical treatment and has been put in plaster, he is safe—he may be blown out of an ambulance, derailed in a train, crashed in an aeroplane or torpedoed at sea, he may be left for weeks in a cellar . . . but so long as his plaster holds he will come to no harm. This assurance is of such immense value to the medical services of an army that where the conditions of transport seem likely to be harassed the plaster method seems bound to find favour. . . ." These sentences from Mr. OGILVIE's concluding article of our symposium on wound infection were in type before the B.E.F. began its withdrawal. In the last few weeks the medical services in Flanders have struggled to do their work under incredible difficulties. Under these conditions the closed plaster method which served the French in beleaguered Paris in 1870 and again during the defence of Verdun in 1916, and which saved countless lives in the army of Republican Spain, has come into its own. In heavy fighting the method has many advantages. It greatly simplifies the supply and distribution of splints, for a stock of plaster bandages does the work of apparatus of many types, each of which must be kept in several sizes. The weight of such a stock may be greater than that of the splints it replaces, but its bulk is less. A well-made plaster case ensures absolute immobility under all conditions, and does not require a skilled personnel to do so, for there is no adjustment of straps or extension cords, no slinging of the splint or choice of special positions. Further, it implies a sealed dressing that cannot be changed without removing the plaster, and thus protects a man who has escaped the primary dangers of anaerobic infection from the risks of a secondary streptococcal contamination. It is applicable to all wounds that have been adequately excised, and is contra-indicated only when damaged tissue that may undergo necrosis remains in the wound, or where there is any vascular damage.

The wounded have now reached England in sufficient numbers to warrant certain conclusions on the general questions raised in the symposium. It is evident that the warning expressed about the dangers of primary suture was not inopportune. The men who were treated by débridement, packing and immobilisation have stood the journey well and landed in excellent condition, in sharp contrast to the few that were sutured and have arrived with grave infections demanding instant surgery. It is necessary to emphasise this danger, for under the conditions of urgent evacuation many casualties must receive their first surgical treatment in hospitals where there is no surgeon with experience of the last war or first-hand knowledge of the ghastly potentialities of infection that lurk in every shell wound. Primary suture of an excised war wound is always an experiment, one only to be undertaken by those with an extensive experience of débridement, and then only in selected cases that can be kept under observation till they are healed. It should never be attempted in cases that must be evacuated, and at times of stress such as the present it is almost criminal. It must also be repeated that in infected wounds any surgical interference beyond the minimum necessary to establish free

drainage and remove absolutely dead tissue and accessible foreign bodies is fraught with the gravest danger of disseminating an infection hitherto localised. It seems clear that the condition of the men who have received no surgical treatment and have reached England anything from two to six days after being wounded is better than could have been anticipated, and far better than that of men evacuated under similar circumstances during the great German attack over the same country in March, 1918. Some have severe infection and even gas gangrene, but many wounds of the knee-joint, gunshot fractures of the femur and lacerations of the buttock, treated by no more than field dressings and splints, have arrived in excellent condition with no more than minor infection. The conclusion seems inescapable that the course of sulphanilamide they have all received in France is responsible for this gratifying and unexpected result. The advantage of plaster-of-paris for immobilising wounds under conditions where transport may be rough and hazardous, where skilled attention and even food may be lacking for long periods, has been demonstrated beyond question. The contrast between the comfort and freedom from pain and the condition of the wound in those who were put in plaster on the other side of the Channel and those who travelled in gutter or skeletal splints has been most striking. Further, many of those who were in pain and had a raised temperature on arrival have become comfortable and apyrexial within 48 hours of a plaster being applied, even though nothing more has been done to their wounds than to change the dressings.

The fighting of May, 1940, then, has taught the medical services lessons that will greatly benefit our wounded in the future: that wounds without laceration will often arrive in good condition at a hospital many miles away if they are dressed, given sulphanilamide and immobilised, while even severe wounds that are excised, packed with vaseline gauze and fixed in a well-made plaster case can if necessary be sent long distances by improvised transport in safety and comfort.

MICE AND MEN

SINCE the time when BEHRING prepared diphtheria antitoxin and EHRLICH salvarsan it has become a recognised practice to assess the therapeutic value of any new remedy on suitable animals before using it in man. And this practice has been justified a thousandfold, not only as a trial of therapeutic efficiency but also in discovering the pharmacology and toxicity of the test substance. Another argument, which appeals particularly to the statistician, is that planned experiments with a sufficient number of test-objects to give a mathematically reliable answer can be carried out on animals in a way which would be impossible or too time-consuming with human material. Breeding at an enormous rate, occupying relatively little space, consuming minimum quantities of food, able to be manipulated with relatively little risk to the experimentor of a lacerating or penetrating wound from claw or tooth, mice are ideal laboratory animals which can be handled in numbers large enough to satisfy even the most exacting statistician. For chemotherapeutic assessment the mouse, being susceptible to hæmolytic streptococci, has proved the efficiency of prontosil, sulphanilamide and sulphapyridine and has differentiated the last from the other two compounds by demonstrating its potency against the pneumococcus. More difficult than these assessments was the preliminary work with the meningococcus, yet here again the sensibly planned animal work has been triumphantly confirmed in man and by analogy extended to the treatment of human infection by the closely related gonococcus. Nevertheless, since it is rarely possible to fulfil the rigid postulates of KOCH and reproduce an exact human disease in a lower animal by inoculation of a specific organism, the difficulties and dangers of applying results from mice to men must never be minimised. In particular, caution is required where the human pathogen has only a low virulence for the experimental animal so that enormous doses are required to kill it, or where the pathology of the animal infection bears no resemblance to the human disease. As an instance, the bacteria which cause the enteric fevers are mostly poorly virulent for the mouse and do not reproduce an experimental infection at all resembling typhoid fever; yet the treatment of the human disease with the sulphonamides has been advocated on the basis of results obtained by animal experiment. In less degree, criticism might be made of the clinical application of results obtained from the intraperitoneal infection of mice with the staphylococcus and the gas-gangrene group of organisms.

Difficulties also arise in assessing the toxicity of a drug from animal experiment. To take again the sulphonamide group as an example, lower animals tolerate these drugs well. The curative dose for mice infected with *Streptococcus pyogenes* or the pneumococcus would be the equivalent of 150 g. daily for a man. And though in man a dose of as little as 3 g. daily may produce definite toxic effects these mostly show themselves in the blood, and there have been no reports of the degenerative changes in the central nervous system which HAWKING [1] demonstrated when massive doses are given to lower animals. Because of the value of sulphanilamide in puerperal sepsis there has always been a temptation to use the drug prophylactically for every woman in labour. COLEBROOK [2] as long ago as 1937 gave it as his considered opinion that such wholesale prophylaxis was undesirable though it was justifiable to use the drug whenever there was sound reason to anticipate puerperal sepsis, for example, in any case delivered with much instrumental interference or in bad surroundings. Similarly, it can and should be used in the treatment of pyelitis of pregnancy.

1. Hawking, F. *Lancet*, 1937, **2**, 1019.
2. Colebrook, L., *Ibid* p. 286.

Because this is so firmly accepted, one could forecast with confidence the effect on a pregnant woman and the fœtus of the relatively large doses which SPEERT [3] administered to pregnant rats throughout the whole period of gestation. No human mother could expect to survive such a course. When rats were fed throughout gestation with sulphanilamide in amounts sufficient to give blood-concentrations of 24 to 36 mg. per 100 c.cm. deleterious effects—intra-uterine and postnatal mortality, decreased litter size and birth weight, and selective stunting of growth—were produced in the offspring. These conditions have no counterpart in the treatment of human infection during or at the end of pregnancy, so that there seems no justification for the author's conclusion, repeated editorially by the *Journal of the American Medical Association*,[4] that until the effects of sulphanilamide on the human fœtus are better known the drug should be administered with extreme caution during pregnancy. Common sense as well as caution is required in the interpretation of animal experiment and its application to man.

3. Speert, H. *Bull. Johns Hopk. Hosp.* March, 1940, p. 139.

4. March 30, 1940, p. 1271.

ANNOTATIONS

BOMB CONCUSSION AND THE EAR

MANY of the casualties now reaching this country are suffering from rupture of the ear drums, and this condition is likely to be common as a result of intensive bombing on the scale experienced in Flanders. In civilian practice a ruptured tympanic membrane is not as a rule accompanied or followed by infection of the middle ear, but the risk of infection is much greater under war conditions where dirt and fatigue play important rôles. Infection apart, large tears may not heal completely and a permanent perforation is undoubtedly a disability which may be troublesome at any time, as well as a cause of deafness. Concussion also affects the inner ear, especially the cochlea. It is most often conveyed by the external auditory meatus and transmitted through the tympanic membrane and tympanum. Quite severe inner-ear disturbances can occur without apparent injury to the drum and are probably produced by violence carried to the oval window by the ossicular chain. The deafness following such injury is usually only temporary, lasting a few hours or days, but it may be permanent. Audiometric investigations show it to be of the nerve or high-bone type with a sudden drop in the curve at about a frequency of 2048 d.v. (the c^4 fork). A considerable personal factor is present: some people seem to be unaffected by prolonged heavy gunfire while others are permanently deafened by a single detonation. In addition to these organic lesions psychoneurotic and even psychotic symptoms are not infrequent sequelæ.

Protection against aural concussion would therefore prevent much suffering and disablement. Some form of occlusion of the external meatus has been practised for many years. A letter in THE LANCET of Aug. 11, 1866, contained the information that in France cotton-wool plugs were used at rifle practice. This example has been intermittently followed to the present day, and certain refinements have been introduced. In 1918 Guild [1] maintained that cotton-wool impregnated with vaseline is the most effective protective device. Other materials have their advantages and disadvantages. Plasticine tends to break away and leave debris in the meatus. Rubber and vulcanite plugs shaped like halma men are made in different sizes, but the former are sometimes difficult to remove and the latter cannot always be made to fit tortuous and narrow channels. Other obvious means of protection are metal flaps attached to the steel helmet or a modified "scrum-cap" incorporating a metal shield. All these methods of what might be called total protection have the disadvantage of cutting off the protected person from aural communication. No doubt this could be overcome by a system of signals, and indeed the objection may not be of much military importance if the explosions are occurring at frequent intervals. There is no obvious reason why the civil population should not use such a device, and it would do something to counteract the sirens and whistles said to be used by German dive-bombers. In the last war certain naval units were issued with vulcanite plugs through the middle of which a hole about an eighth of an inch in diameter was bored. The protection against concussion was considered to be adequate, and considerable hearing was still possible. However, these plugs expose the inner ear to continuous loud noise and thus may possibly lead to deafness. The blast from a near-by explosion is probably partly conveyed through the bones of the skull and against this it is difficult to conceive an appropriate method of protection.

1. Guild, S. R. *Anat. Rec.* 1918, **15**, 36.

THE LATENT PERIOD IN CARCINOGENESIS

ACCORDING to experimental data the shortest known interval between the first application of a carcinogenic chemical to the skin of mice and the appearance of a tumour is 31 days; the longest is a matter of years. The latent interval may include a considerable lapse of time between the last application of the chemical or physical agent and the appearance of the tumour—in man as much as 30 years. The whole period is often referred to as the precancerous stage. While this description is true of a minute fraction, perhaps only one cell, in the treated area, it cannot with certainty be said to apply to every part reached by the carcinogenic chemical. As a rule one or at most a few tumours grow in the treated region, which is itself vastly bigger than the actual site of origin of the tumour. The greater part may never progress to cancer except through extension from one focus. The position of a future tumour is unpredictable, which suggests that at some stage of the process a hitherto undetected factor intervenes either to add to or take away something. It would be logical to maintain that until the site of a tumour becomes predictable it is futile to try to discover the morphological or physiological changes which precede it. Nevertheless this aspect of experimental cancer has proved an irresistible lure to many morphologists. From none of the descriptions of late results of tarring or painting of pure substances has there emerged any peculiarity either local or general of cell or tissue response in the latent period. Such changes as occur—for example, in the skin, hyperplasia and hypertrophy—are not specific. They follow the action of many other agents. With the exception of some observations by Page [1] on nuclear swelling, the earliest response to

1. Page, R. C. *Arch. Path.* 1938, **26**, 800.

the first application of these substances appears to have escaped attention. Pullinger[2] now claims that several highly active chemical carcinogens provoke a reaction within a week which is characteristic and possibly specific. A severe injury in the form of hydropic degeneration is accompanied by progressive swelling of cytoplasm and nuclei to a size remarkable for cells of the squamous epithelium of mice. Recovery and subsequent differentiation of the injured cells is the rule, premature death the exception. Related non-carcinogenic hydrocarbons injure the epithelium slightly but do not produce the characteristic reaction. The relationship of this reaction to cancer formation depends on the observations that the response is spread over the whole treated surface, and Mider and Morton[3] have shown that carcinoma may result from a single application to the skin of methylcholanthrene. We may have in this response the first or an early essential step in the whole long story. Unfortunately those substances which cause tumours to appear more slowly do not give rise to the whole of the characteristic reaction. That it appears at some time during the course of repeated applications has not yet been excluded.

TRANSVERSE ABDOMINAL INCISIONS

THE first requirement of an incision in abdominal surgery is that it should give a free exposure of the field of operation, and this is of especial importance in war surgery. Speed and gentleness, the criteria of good operating, cannot be achieved if the surgeon is working in a confined space. But the anatomy and physiology of the abdomen must be respected if no permanent damage is to be done to it. For general purposes the mid-line and paramedian incisions are deservedly popular, particularly the latter, but there are two objections to them. They depend on deep muscular relaxation if the lateral parts of the abdomen are to be reached: and the tendinous and fascial sheets are divided at right angles to the direction of maximum strain so that there is a strong tendency for disruption of the wound during healing. Why not open the abdomen through a transverse incision? The idea is not new but has never become popular. A recent account by Hunter[4] of a series of cases in which transverse incisions were used for pelvic operations raises the question whether this approach might not be used for general abdominal surgery and particularly for war wounds. The rectus muscles were not cut across but were merely retracted in most of Hunter's cases and these are of small interest to the surgeon because such an incision cannot give a sufficiently free exposure for an exploratory laparotomy. In 27 cases, however, the recti were divided. The exposure was excellent and the ultimate result apparently very satisfactory, although incisional hernia seems not to have been avoided completely. Hunter says that it is unnecessary to sew the rectus to its sheath before cutting it since there is very little retraction, and when closing the wound it is sufficient to suture the sheath alone in order to obtain satisfactory union of the muscle. Such an incision has great advantages. It is made along the lines of stress in the abdominal fasciæ and because the rectus is divided the wound falls open easily. It can be extended into the loin on each side by cutting the oblique muscles parallel with the nerves, and the fixed parts of the colon would thus be freely exposed, a point of importance in war surgery. The main disadvantage of this incision is that it is slow to make because of the free hæmorrhage from the cut muscles.

2. Pullinger, B. D. *J. Path. Bact.* May, 1940, p. 463.
3. Mider, G. B. and Morton, J. J. *Amer. J. Path.* 1939, **15**, 299.
4. Hunter, E. W. *Amer. J. Obstet. Gynec.* April, 1940, p. 593.

THE B.L.B. APPARATUS

Boothby, Lovelace and Uihlein of Rochester[1] have introduced a modification of the B.L.B. apparatus for the administration of oxygen which they claim has advantages over the original model, especially in aviation. In this the metal valve is replaced by a sponge-rubber disk in a suitable receptacle moulded directly into the rubber mask, thus avoiding the use of the metal connecting tube of the older apparatus. The disadvantages of the metal valve are said to have been overcome by the new arrangement, which possesses the merits of simplicity, lightness and low cost. The defects of the metal valve are very real, but although the rubber-sponge disk avoids these the disk itself may not be a perfect substitute since it tends to collect water from the expired air and after a time the exit of air from the apparatus may be impeded. The sponge may also trap organisms and be troublesome to disinfect. According to Boothby and his colleagues "a flow of oxygen of approximately 2, 2·5 and 3 litres per minute will maintain, on the average, the alveolar oxygen at close to 50 per cent. for small, medium-sized and large men, respectively," and "a flow of approximately 5·5, 6·5 and 7·5 litres per minute is sufficient to maintain the alveolar oxygen at about 92 per cent." These figures are similar to those obtained with the older model but many more observations will have to be carried out to determine whether the correspondence between the two forms is so exact.

DEVELOPMENTS IN THE TREATMENT OF LEPROSY

IN his address to the meeting of the British Empire Leprosy Relief Association on May 6, Dr. Ernest Muir,[2] the medical secretary of the association, referred in a sentence to results obtained at the leprosy institution at Chiengmai, N. Siam, from experiments on leprosy along entirely new lines. More details are now available about this work which although still in the early experimental stage seems full of promise. One part of the work consisted in the injection of diphtheria antitoxin into patients during an exacerbation of the disease. This had the effect not only of immediately clearing up the reaction but also of causing what seemed to be a permanent improvement of the leprous condition. A natural sequel to this finding was the injection of patients with diphtheria formol-toxoid, and again encouraging results are reported. Dr. Collier, of the American Presbyterian Mission at Chiengmai, concluded after a survey of 400 treated cases that in general the activity of the disease was brought to a halt almost immediately and healing began. If the disease was already regressing a few doses of toxoid seem to accelerate healing; if it were actively progressing larger doses and a longer period of treatment were required, but in almost every case there was a response, though he admits it may only be temporary. Dr. Maufred Obendorffer has been able to produce leprosy in monkeys by injecting them first with sapotoxins from colocasia plants, and then with leprous material; injection of either sapotoxin or leproma alone had no effect. The difficulty of infecting laboratory animals with human leprosy has always been a great stumbling-block to the study of the disease and its treatment, and in this connexion it will be remembered that Prof. S. Adler of Jerusalem lately reported the infection of Syrian hamsters with human

1. Boothby, W. M., Lovelace, W. R. and Uihlein, A. *Proc. Mayo Clin.* March 27, 1940, p. 194.
2. See *Lancet*, May 11, 1940, p. 880.

material. It is important in animal experiments to distinguish mere survival of the organism at the site of inoculation from the spread of infection to other tissues. In the Siam work it is claimed that a true leprous infection has been produced in monkeys, and we may therefore look forward to more extensive and controlled work on the treatment of the experimental disease with diphtheria toxoid and antitoxin. The relationship of the mycobacteria to the corynebacteria suggests that this line of treatment is not wholly empirical.

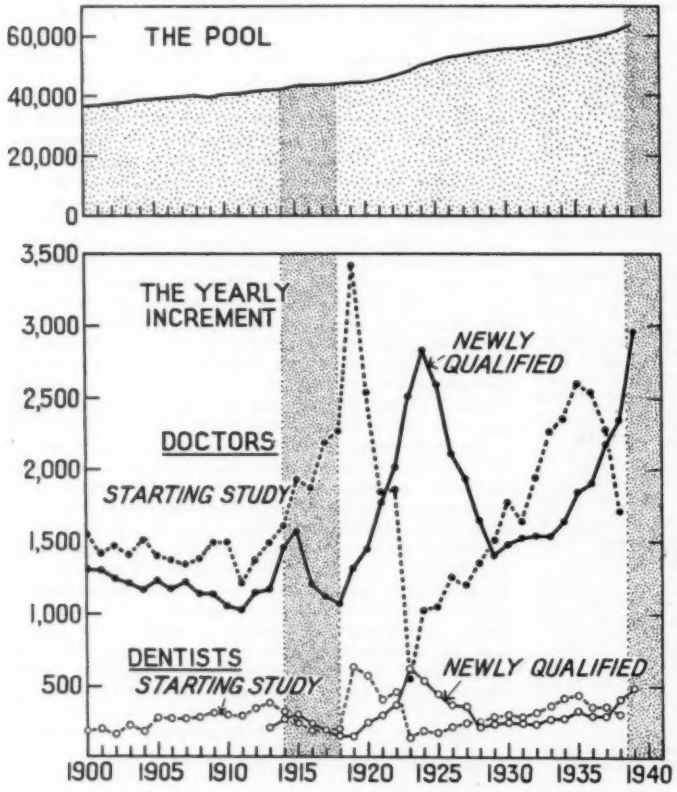
THE MEDICAL POOL

THE basic facts in the supply of medical personnel are given in the registers issued yearly by the General Medical Council. The Medical and Dentists Registers [1] for 1940 tell a story that cannot be gainsaid of the recruitment of doctors and dentists for the nation. For many years we have published a graph of the annual increment, both of those starting on their studies and those newly qualified to practise. This graph has been brought up to date and we have added a graph of the growing size of the medical pool, plotted from the total number of names on the medical register on the first day of each year.

The Medical Register 1940 contains 63,410 names, 2000 more than any previous year, and adequate, one must hope, for the calls made upon medicine from any source. The number of names added by registration during the year 1939 is 2968, a figure quite without precedent and higher than the peak year of 1924; but this will be the summit, especially as there is good reason to believe that many who were expecting to qualify leisurely in 1940 made an attempt to do so in 1939—an attempt which was patriotic even if not always successful. Of the 2968 names 1437 were registered in England, 692 in Scotland and 356 in Ireland, while 296 were added to the Colonial and 187 to the Foreign list. The 1940 register, no doubt for reasons of economy, has left out the usual section of medical acts and regulations; for this reason the 1939 register should not be lightly thrown away.

The Dentists Register 1940 contains 15,200 names, nearly 500 more than last year and almost that number more than ever before. This increase is subject to a deduction of names removed from the register for failure to pay the annual retention fee, of which the usual statistics were not available, owing to war conditions, when the register went to press. Only 170 names were removed during 1939 on other grounds (all except two on evidence of death), and 210 names were restored. There was, however, a gratifying expansion of the ranks of the profession during the year, for 418 persons were registered as graduates or licentiates, a number which has not been equalled since 1925. Apart from the revision of names, the only important alteration in the register is the reminder under "Registration Fees" of the reduction in the normal retention fee to £2 during the war, and of the exemption from payment of the fee accorded to practitioners engaged in war service. This volume also omits the text of the Dentists Acts and the regulations of the Dental Board. Perhaps the omission of the local list at the end will be felt more keenly, but such a list must needs be misleading at the present time.

1. Published for the General Medical Council by Constable and Co. Price 21s. and 12s. respectively.



ADVISORY COMMITTEE ON FOOD POLICY

THE Select Committee on National Expenditure, whose report was discussed in these columns on May 25 (p. 971), recommended the setting up of an authoritative body of scientists and practical men to work out a wartime food policy for the country which would aim at providing an adequate diet at the least possible cost in shipping and foreign currency. The advisory body has now been appointed as follows: Sir William Bragg, P.R.S. (chairman); Sir Alan Anderson, M.P. (deputy-chairman); Prof. A. W. Ashby, professor of agricultural economics, Aberystwyth; Prof. E. P. Cathcart, F.R.S., regius professor of physiology, Glasgow; Mr. Henry Clay, economic adviser to the Bank of England; Prof. F. L. Engledow, professor of agriculture, Cambridge; Mr. W. Gavin, agricultural adviser to the Ministry of Agriculture; Sir Edward Mellanby, F.R.S., secretary of the Medical Research Council; Sir John Orr, F.R.S., director of the Rowett Research Institute, Aberdeen; Prof. J. A. Scott Watson, professor of rural economy, Oxford; Prof. D. M. S. Watson, F.R.S. (secretary), professor of zoology and comparative anatomy, University College, London.

SPECIAL ARTICLES

GENERAL MEDICAL COUNCIL

SUMMER SESSION, MAY 28–29, 1940

(*Concluded from p.* 1021)

THE council considered several cases in which judgment had been postponed from previous sessions, and did not erase any name from the register. The name of Henry Nunan Collier, erased at the May session, 1938, was restored to the register.

Charges against Medical Practitioners

DRUNKENNESS AND MOTORING OFFENCES

Two practitioners appeared before the council in consequence of conviction for offences involving drunkenness, and the council directed that the name of one of them should be erased from the register. The other name was not erased.

John William Paterson Collier, registered as of Viewfield, Rigside, Douglas Water, Lanark, M.B. Edin. 1922, had been summoned to appear before the council on the charge:—

That you were convicted of the following offences: (1) On Nov. 14, 1934, at the sheriff court of Hamilton, of driving a motor-car while under the influence of drink and were fined £20; (2) On Sept. 18, 1936, at the sheriff court of Lanark, of driving and being in charge of a motor-car while under the influence of drink to such an extent as to be incapable of having proper control of the motor-car, and were fined £20 or sixty days' imprisonment; (3) On May 28, 1937, at the sheriff court of Edinburgh, of driving a motor-car while under the influence of drink to such an extent as to be incapable of having proper control of motor-car, and were fined £20; and (4) On April 21, 1939, at the sheriff court of Lanark: (*a*) Of driving a motor-car without due care and attention and without reasonable consideration for other persons using the road, and causing the vehicle to collide with and damage a motor omnibus then stationary on the road; (*b*) Of driving the motor-car while under the influence of drink to such an extent as to be incapable of having proper control of the motor-car, and were fined £2 or ten days' imprisonment in respect of the first charge, and £10 or thirty days' imprisonment in respect of the second charge, the sentences to run concurrently, and your driving licence was suspended for six months.

Dr. Collier expressed his regret. He admitted that he had recently been discharged from the Army on account of an adverse report from his colonel, who said he "drank too much." The registrar was directed to erase his name.

CONVICTED OF FELONY

Benjamin David Ling, registered as of 3, Buckingham Drive, Carmyle, Glasgow, E.2, M.B. Glasg. 1937, was summoned to appear before the council on the following charge:—

That you were at the Assizes for the county of Warwick held at Birmingham commencing on Nov. 30, 1939, convicted (1) Of the following felony, namely, that between Dec. 1, 1938, and Feb. 14, 1939, you unlawfully used an instrument or some other unknown means with intent to procure the miscarriage of Elizabeth Potter Alexander; (2) Of the following misdemeanour, namely, that between the same dates you conspired with Doris Ettie Jackson and with other persons unknown unlawfully to use an instrument or other unknown means with intent to procure the miscarriage of Elizabeth Potter Alexander; and were sentenced to twelve calendar months' imprisonment on each count, the sentences to run concurrently.

Dr. Ling appeared but was not represented. He said he had been friendly with Miss Alexander for seven years. He had performed the abortion to avert a scandal, and had become engaged to her and had married her before his conviction. He was of military age and anxious to serve his country as a doctor. The council directed the registrar to erase his name.

CONCEALMENT OF BIRTH

Arthur James Daly, registered as of Flat 2, Warwick House, 433, Mansfield Road, Nottingham, M.R.C.S. 1925, was summoned to appear before the council on the following charge:—

That you were at the Notts Assizes commencing on Feb. 26, 1940, convicted of endeavouring to conceal the birth of a child by secretly disposing of its dead body, and were sentenced to three days' imprisonment.

Dr. Daly appeared, accompanied by Mr. A. A. Pereira, counsel, instructed by Messrs. Le Brasseur and Oakley. The council's solicitor explained that the child was that of a single woman and of Dr. Daly. They had agreed to have the child adopted. He attended her at the birth, which took place somewhat before he expected at her parent's house. He stated at the trial that when he delivered the child he placed it on its side on a pad of cotton-wool which he had placed on the bed, and swabbed out its throat and nose with bits of cotton-wool. While doing so he became aware that the mother was about to have a hæmorrhage and had to attend to her. When she was safe, he found that the child showed no signs of life, and applied artificial respiration without success. He wrapped the body in cotton-wool and carried it about with him in his bag for a few days. He then took it to a caravan which he had hired before the birth, and left the body there in a box, where it was discovered by the farmer on whose farm the caravan stood. Dr. Daly was charged with murder and acquitted but found guilty of concealment of birth, to which charge he had pleaded guilty. The judge took into consideration his long imprisonment awaiting trial. In answer to Mr. Pereira, Dr. Daly said that he had become acquainted with the woman socially and had had sexual intercourse with her before he had ever treated her professionally. Mr. Pereira urged on the council that the doctor's error did not go against him in his professional capacity to an extent which would justify the erasure of his name from the register, and the council decided not to direct its erasure.

CANVASSING AND ADVERTISEMENT

Horatio Matthews, registered as of 30, Harley Street, London, W.1, M.D. Glasg. 1910, was summoned to appear before the council on the following charge:—

That being a registered medical practitioner you canvassed and advertised in or about the months of February and April, 1940, for the purpose of obtaining patients and promoting your own professional advantage in respect of your practice as a registered medical practitioner carried on by you at 30, Harley Street, London, W.1 (1) By circulating to various commercial concerns your visiting cards having your professional address thereon, together with a notice having on one side the words: *For Your Notice-board*, and on the other side the following words: *Ophthalmic Notice.* "During the present emergency, arrangements for the examination of eyesight of any of the staff or their families who may wish it, may be made, either at Harley Street, or at certain alternative rooms outside, for the reduced fee of one guinea through the Secretary, Staff Association of this Establishment"; and in particular: (*a*) On or about Feb. 2, 1920, to Low Temperature Carbonisation Ltd., of 28, Grosvenor Place, London, S.W.1; and (*b*) On or about Feb. 8, 1940, to the secretary of The London Assurance, of 1, King William Street, London, E.C.4. (2) By writing to the secretary of The London Assurance on April 20, 1940, proposing that such company should make it part of their policy to keep a register from time to time of the state of sight of their insured members in anticipation of certain possible claims mentioned in such letter, and further proposing that you should be asked to do this for the company. And that in relation to the facts so alleged you have been guilty of infamous conduct in a professional respect.

The complainants were Messrs. Low Temperature Carbonisation Ltd. and The London Assurance.

Dr. Matthews appeared but was not legally represented. The council's solicitor called officials of the two complaining companies, who said they had been rung up by someone calling himself Dr. Matthews and suggesting that they should take part in an arrangement by which the members of their staffs would have their eyes examined. Without invitation of any kind, the cards and notices complained of, and a mass of literature relating to a scheme for medical examination of their employees, had been sent to them. Dr. Matthews, addressing the council at considerable length, said that he had sent the literature to these and other firms in pursuance of the determined policy of an association which he had founded in the conviction that the present national ophthalmic services were misconceived and working on wrong lines. He had never seen a patient as a result of these activities and had not undertaken them for his own gain or advancement, but because he was a capable organiser and an enthusiast for the policy. If a patient applied, he would send him to one of the thirty odd colleagues who were members of the association. He was aware that he was following a dangerous course, and had in fact pursued it with the object of bringing the scheme to the notice of the council as the only possible way of obtaining professional recognition of it. The president announced that the council had found the charges proved; they took a grave view of the methods adopted by Dr. Matthews of prosecuting whatever scheme he had been interested in, and suspended judgment for a year subject to the usual provisos of good behaviour attested by professional brethren of the respondent.

The Pharmacopœia

The chairman of the pharmacopœia committee, Prof. David Campbell, said that the number of copies of the British Pharmacopœia, 1932, which had been sold up to date was 48,511, and of the 1936 Addendum 11,813. The work had extended during the past six months in three main directions. For the next edition of the Pharmacopœia 604 monographs had been completed, and when more favourable circumstances arose a new edition might be published. In the meantime it had been found necessary to prepare another addendum: this was complete and in the press. Work was in progress on a third addendum in which it was proposed to include monographs dealing with certain substances not formerly made in this country but now produced by British manufacturers, in some instances under licence granted by the Comptroller of Patents. The names under which the substances would be designated had been published, and monographs on ten of them had been prepared. He appealed to all members of the profession to use as far as possible these substances as suggested by the Pharmacopœia, and support the valuable efforts of the manufacturers. For some of these preparations biological tests were required, and the Pharmacopœia Commission had been fortunate in securing the assistance and goodwill of Sir Henry Dale, F.R.S., director of the National Institute of Medical Research, who would keep in that institute the standards of these preparations. The Pharmacopœia has thus been greatly strengthened by the inclusion of tests and assays which could not otherwise have been defined.

Satisfactory Financial Position

Dr. J. W. Bone, chairman of the finance committee, said that the council had saved £960 through the short sittings at its recent sessions; in spite of an expenditure of £200 on air-raid precautions it now had a surplus of £7409 for the year. Its assets were now £137,000.

SCOTLAND

(FROM OUR OWN CORRESPONDENT)

BLOOD-TRANSFUSION SERVICE

A NEW drive has started to increase the number of voluntary blood-donors. In Edinburgh and district 3000 donors are already enrolled but a further 3000 are being asked for. Ever since the transfusion service was organised on a war-time basis last September the bank in Edinburgh has been kept stocked and supplies continually used for civil purposes. Blood was drawn from the bank for the treatment of a sailor wounded in the Firth of Forth raid in October. There is a full organisation in being for the immediate distribution of banked blood to the surrounding area and for the immediate replenishment of the bank. Members of the service are on duty continuously and parties are sent out to draw blood in surrounding towns in order that the organisation in each of the subcentres may be kept in action. During the present campaign posters, newspaper articles and photographs are employed to attract and increase public attention and to remove any fears of possible dangers or inconvenience. The centres of the service in Glasgow, Dundee, Aberdeen and Inverness, as well as in the Orkney and Shetland Islands, are also actively recruiting new donors as well as maintaining blood-banks and full services. It is only fair that the public should realise that the transfusion services, in Scotland at any rate, are in an advanced state of preparedness, for a contrary impression could quite easily be taken from Dr. Dyke's letter which appeared in THE LANCET of last week (p. 1027).

STUDENTS AND THE WAR EFFORT

There has been considerable agitation among Edinburgh medical students for an intensification and shortening of the medical curriculum. At a meeting held in the university union the following motion was unanimously passed: "that in view of the present war situation this House is of the opinion that, in the case of medical students, university vacations should be drastically curtailed forthwith." Many students expressed their unwillingness to waste three months in a long vacation while others were working overtime in industry or enduring hardship in the services. It was suggested that a fourth term should be instituted, and indeed the first-year students expressed a desire to work continuously in order that they might qualify in three and a half instead of five years. It is understood that the university authorities are unwilling to conduct a full teaching term during the summer vacation or shorten the curriculum but it is likely that some arrangements will be made to enable students of the clinical years to spend at least part of the long vacation in general and special hospital work. It seems much more likely that the first-year and second-year students will be recruited into agriculture and forestry for the vacation.

EDINBURGH'S HEALTH IN WAR-TIME

Dr. W. G. Clark, medical officer of health for Edinburgh, stated recently that there had been an increase in ill health and disease in Edinburgh since the war broke out. During last winter and spring a great increase had occurred in the incidence of cerebro-spinal fever, but it was not the troops who had been particularly affected, as in the last war, but the civilians. In the first four months of 1938 there were eight cases in Edinburgh; in the same period in 1939 there were eleven; but in the first four months of this year there had been 193 cases. Although the provision

of A.R.P. beds had reduced the number of civilian beds in the city's hospitals this shortage had been more apparent than real since, with few exceptions, the reserved beds had been fully occupied.

NEW X-RAY TUBE IN EDINBURGH

Five years ago the Edinburgh Royal Infirmary installed two 250,000 volt X-ray tubes for the treatment of malignant disease. Ever since then they have been working at their fullest capacity, but even so it has not been possible to overtake all the necessary work. Approximately 850 patients have been treated a year and some 17,000 separate treatments have been given. Now, through the generosity of the trustees of the Melville bequest, it has been possible to purchase a third tube, taking advantage of a considerably reduced price offered by Metropolitan Vickers Electrical Co. It is hoped that the new tube will be in operation in a short time. The gift of the Melville trustees will not only enable the managers to purchase the apparatus itself but also to carry out the necessary reconstruction for its housing and erection. During the last five years the staff of the radiological department have been fully occupied with deep X-ray therapy and have achieved highly satisfactory results. The necessary elaborate record-keeping and "follow-up" of patients have been well carried out by a special staff.

COMPOUND AND INFECTED FRACTURES

In an address to the West London Medico-Chirurgical Society on May 22 Mr. R. Watson Jones said that in the past too much attention had been paid in the treatment of compound fractures to the invading organisms and not enough to the tissues themselves. The first-aid treatment had been the application of iodine or other antiseptics for destroying the organisms, and many had the erroneous idea that in this way they were sterilising the wound. First-aid treatment might indeed include the application of iodine, but it must secure, what was of much more importance, the continued and complete immobilisation of the tissues. The immediate treatment should by all means include the removal of foreign bodies and of the main mass of infected tissue, but it could never be hoped by any operation to render the wound sterile. It was much more important to remove devitalised tissues in which organisms could develop. The object was not to kill every germ but to encourage the natural defences of the body. It had been proved that in a large proportion of compound fractures the gas-gangrene bacillus was present in some part of the wound, but only in a small proportion of these cases did gas-gangrene infection develop. Many people who were careless in their toilet must day by day be implanting gas-gangrene organisms in their nails or in cracks in their skin, and yet the infection did not develop because there was no tissue in which it could grow.

The first stage in the treatment of compound fractures, Mr. Watson Jones went on, was the treatment of shock. Urgent as operation might be, if it was performed immediately, before the patient had had an opportunity of recovering from his shock, he might die. The main element in the treatment of shock was immobility of the limb and also warmth. Two or three months ago Mr. Watson Jones himself sustained injuries in a motor-car accident, and he knew for the first time what shock really meant and what cold really meant. He had never supposed that it was possible to be so cold and still to live. As soon as the patient's condition would permit operative excision of the wound must be performed. In civil life they had become accustomed to the distinction between the small punctured wound of the fracture compound from within and the large ulcerated wound of the fracture compound from without. In war-time that distinction was dangerous, for a small punctured wound might conceal extensive soft-tissue injuries beneath. Every wound produced by shrapnel, bomb or falling masonry must be excised and fully explored. He urged that no single layer should be sutured, except perhaps the skin. No catgut should be buried. They had all accepted the principle that no foreign body should be buried in a compound fracture which had been excised. It was dangerous to put in screws and plates and wire because these produce a serous reaction which encourages the development of organisms. But it had not generally been recognised that catgut was a foreign body, and would be surrounded by a sero-fibrous exudate which might well turn the scales between infection and straightforward healing. Opinions were divided whether the skin should be sutured. In civilian practice as a rule wounds could be safely sutured if the case was seen within six or eight hours and the suturing could be done without tension; but any surgeon who was not accustomed to the treatment of compound fractures and who now was faced with these problems should during the first two or three months refrain from suturing the skin in any case. There was no safer treatment of any compound fracture than really sound excision of the wound, which was then lightly packed with gauze and covered with a plaster.

Public Health

Health Policy for County Councils

In a small brochure[1] addressed particularly to his own council in Caernarvon, Dr. Griffith Evans has appealed to county councils to ensure so far as lies in their power that the people get "fresh, natural, whole food," and he suggests that this may be achieved among other ways by establishing market gardens in association with sewage-disposal schemes. His booklet contains one chapter on the aftercare of tuberculosis and five on dietetic aspects of county health functions. Dr. Evans suggests that the tuberculosis scheme has partly failed because, though treatment is thought to be worthy of state support, aftercare is looked on as a frill and is left to private charity and voluntary committees. Dr. Evans strongly favours the village settlement, and is anxious for the establishment of one in Wales.

Infectious Disease in England and Wales

DURING THE WEEK ENDED MAY 18, 1940

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 875; whooping-cough, 508; diphtheria, 676; enteric fever, 46; measles (excluding rubella), 6549; pneumonia (primary or influenzal), 719; puerperal pyrexia, 160; cerebrospinal fever, 334; poliomyelitis, 3; polio-encephalitis, 1; encephalitis lethargica, 5; dysentery, 38; ophthalmia neonatorum, 83. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on May 17 was 784, made up of: scarlet fever, 120; diphtheria, 98; measles, 16; whooping-cough, 28; enteritis, 67; chicken-pox, 47;

1. Notes on Health Policy for County Councils. Newton, Mon: Welsh Outlook Press. 1940. Pp. 37. 1s.

erysipelas, 36; mumps, 10; poliomyelitis, 1; dysentery, 3; cerebrospinal fever, 91; puerperal sepsis, 33; enteric fevers, 4; german measles, 56; other diseases (non-infectious), 70; not yet diagnosed, 104.

Deaths.—In 126 great towns, including London, there was no death from smallpox or scarlet fever, 1 (0) from enteric fever, 2 (0) from whooping-cough, 5 (0) from measles, 15 (0) from diphtheria, 29 (6) from diarrhœa and enteritis under 2 years, and 25 (3) from influenza. The figures in parentheses are those for London itself.

Birkenhead reported the fatal case of enteric fever, Birmingham and Coventry each had 3 deaths from diarrhœa, Bristol and Coventry each 3 deaths from influenza.

IN ENGLAND NOW

A running commentary from our Peripatetic Correspondents

For some time before the invasion of Holland and Belgium the Ministry of Health had made plans for the reception, medical examination, feeding and lodging of the refugees who might be expected. When "the balloon went up" I was at a certain "port on the South-East coast" and gave what help I could to the local authority on whom the task actually devolved. A crowded fortnight followed. For three or four days nothing happened and we had time to organise a combined scheme with the immigration officials, security police, ambulance services, hospitals, public assistance, Red Cross and W.V.S., which stood the test of use. Then they began to come. First three trawlers from Rotterdam, stinking to high heaven of rotten fish and crowded with Jewish refugees who had paid a fantastic passage money. Among them were, surprisingly, eight escaped Polish prisoners—"des solides gars," in green German prisoners' overalls. Then, at dusk, a large packet-boat with nearly two thousand Belgians, needing more than twelve hours continuous work before the last had trickled through the various controls; twelve hours of question—"Vous êtes en bonne santé?" "Pas de contact avec les maladies infectieuses?" Twelve hours of gazing into faces, of lifting hats, of inspecting hands and wrists, twelve hours of labelling with the appropriate coloured labels. The experience showed that to do everything on the boat took too long and from then on the refugees were landed at once, passed through the customs, then medical inspection, then a walk to a roller-skating rink where tea, bread and cheese were provided, on to an ex-ballroom for immigration and security controls and so back to the waiting trains. For the old and exhausted a short cut was arranged and each boat was visited by a medical officer to see to the immediate hospitalisation of the acutely sick or wounded. On one boat we found a complete orthopædic hospital of nearly 150 cripples, mostly children in plaster, with attendant nuns and nurses, which had tried to follow its medical director into France and had arrived in England instead. Thanks to a corps of A.R.P. stretcher-bearers and a hospital train the whole lot was on its way to a British orthopædic hospital in a very short time. I shall not easily forget the sister superior, rocking on her feet with weariness, surveying the disorder and messes of the third-class saloon as the last child was carried out and suddenly billowing forward like a three-master under full sail to retrieve under one arm a pair of crutches, and under the other a white woollen rabbit with pink ears.

Other impressions are of the delight of the port sanitary inspector—the only veteran who had done the same work before—at being recognised by a Belgian woman whom he had rescued as a girl from an overturned fishing boat in the inner harbour in 1914; of a "flight" of French fishing boats of various sizes, who had asked our hospitality for the night, setting out jauntily at dawn like a family of wild duck for the long sail down the Channel, washing hanging from the rigging and the children's faces scrubbed, in spite of a night in the open alongside the quay and the horrors that had gone before; of the Red Cross commandant's reply on the telephone at 4 A.M. when she was asked without warning to supply tea for up to 1500 wounded on a hospital ship arriving in a quarter of an hour—"Will do what we can" and not another word—they did it, and the ship never arrived; of the gloomy huddle of Fifth Column suspects under guard; and above all of the courage and smiling patience with which all greeted what must have seemed to them the endless formalities of their arrival.

Apart from the few wounded and injured, the sick were a very mixed bag. A baby with measles and a child with tinea were the only infectious and contagious diseases detected. Only two hysterias, an acute delusional insanity and an attempted suicide—all as it happened in British subjects—an acute tonsillitis, a cardiac failure and a cerebral hæmorrhage occurring after the boat had berthed—these were some of the cases that come to mind. The proportion needing immediate admission to hospital was only 0·2 per cent. The most useful things in the first-aid bag I had prepared were a bag of boiled sweets for the children and seasick, aspirin, bromide and grey powder. The morphia, shell dressings and half an inner cycle-tyre tube for a tourniquet were fortunately not required, but over all was the haunting thought of what would happen if one of the frequent air-raid warnings should result in bombs.

Now the picture changed. The flood became a trickle, then ceased. The immigration officers, security police and ourselves gave way to R.T.O.'s, staff officers and R.A.M.C. and then the flood began again, but this time in khaki. "Just like '14," said our Admirable Crichton of a sanitary inspector.

* * *

Man cannot live by news alone, but today he very nearly does. And the more voracious we are for it the scarcer it becomes. Now the paper shortage has made it impossible for the shortsighted, at any rate, to glean anything from a 'bus. The screaming placards confine themselves to uninteresting permanent statements such as ALL THE LATEST WAR NEWS, or READ THE WAR NEWS IN THE DAILY DASH, while the sensations of the hour are inconspicuously chalked up in unpractised capitals on blackboards. Will there soon be a Will Hay at every street corner? And will Lords R—— and B—— compete for the ex-pavement artist with the most effective flourish?

* * *

There came the other day into the casualty department a case of foreign body in the œsophagus. The patient had been eating a mutton-chop to his midday dinner when he felt something stick in his throat, and then had a pain which he referred to the lower edge of the thyroid cartilage. The casualty officer examined him with a laryngoscope and finding nothing took him over to the X-ray department where he gave him a "barium swallow" and thought there was some "hold-up." He brought him back and sent for the admitting-officer. The admitting-officer came and examined him with the laryngoscope and found nothing abnormal; so he took him again to the X-ray department. He thought that the barium divided into two at the site of the pain, so he took him back to the casualty department and admitted him. Then he rang up his chief, and told him all the investigations that had been made. His chief wanted to know whether his tongue was furred and what his expression was when swallowing, and the house-surgeon went to the ward to make these observations. But the patient said he was too tired to drink, and there was so much barium on the tongue that it could not be seen whether it was furred or not. So the surgeon decided to do

nothing for the night. Next day the dresser wrote a report in which he filled in all the particulars including the patient's age and address in the spaces provided, and entered all the investigations that had been performed so that no-one ever looked at them again. The registrar congratulated him on the excellency of his report. That evening a junior pro wrote home and this was her letter:

My darling old Mumsie,

I had a thrilling time yesterday but rather sad. They sent me to the casualty department, and there came in a dear old man, aged 81, who looked just like grandpa. He had pink cheeks and blue eyes, with a bald head and a little ring of white curly hair round it. I simply loved him, his hands were all twisted and gnarled, and he had walked all the way to the hospital. It had taken him 25 minutes. I do not believe that grandpa could have walked all that time. He was very tired so I sat him down in a chair and gave him some water to drink and he got better. He said it hurt him to swallow but I don't think it did very much because he did not make faces as he swallowed. Then the doctor on duty came along and took him into another room where it was all dark except for one bright light. He put a thing on his head and sat opposite the old man and caught hold of his tongue and put a little mirror in his mouth and said he could not see anything and he must have him X-rayed. So he took him along and sister sent me with him in case anything happened. It is quite a long way to the X-ray place; about as far as it is down the garden to grandpa's seat that he calls "his utmost limit," where he sits in the sun when it is warm. But there wasn't any sun in this room which was all dark and felt cold and clammy. The old man had to take his clothes off—and stand in a tiny space while they made sparks behind him which they caught on a piece of yellow glass they call a screen. Then they made him hold a mug of white paste in his hand and put some in his mouth and swallow; and sometimes he swallowed at the right moment and sometimes he did not, so that altogether he had to do it quite a lot of times; and oh! it was so exciting to watch the paste shoot past his throat and down in front of his spine; and I saw his heart beating so that mine almost stopped. And then I thought of the poor old man; because I am sure grandpa would never have put up with it. He would have cursed and sworn, and thrown the mug on the floor long before the end of it. And in the end the doctor said; "we must send for the admitting-officer; take him back to the casualty department, please, nurse." So we went back with him leaning on my arm just as grandpa does when he comes back from the "utmost limit"; and I sat him down in a chair and gave him a cup of tea, but it hurt him more than it did before as I could see from his face. Luckily the admitting-officer was a long time coming so the old man had had a bit of rest; because he took him into the dark room again and examined him with the little mirror. He said, "I cannot see anything abnormal, I must see him under the X-rays." So off we went again to the X-ray department, but he leant very heavily on my arm this time. Then we went all through it again, but I was not a bit excited because I knew my old man was getting very very tired, and they did it again and again because the casualty officer said he thought there was a "hold-up," but the admitting-officer said no, he thought there was a duplication of the stream, and they each tried to make the other see what they saw, until the admitting-officer said, "Well I must go and do a white-cell count. We shall have to admit him." And then he looked at his watch and said "Oh damn! I'm late, will you do it for me?" and the other said, "Take him back to the casualty-room please nurse." Then I had to tell the operating-theatre to get the endoscopy instruments ready as someone would be coming down to remove the mutton bone. These are long metal tubes with an electric light at the end that they push down nearly into your stomach. But they did not do it. I heard the admitting-officer talk about it when I took in the doctor's cup of tea. He was saying "No! the old man won't come down, says we've pulled him about enough for one evening."

In my time off today I went up to see my old man. He shook me by the hand and asked whether he could go home. He was better and said he had enjoyed the fish and tatters they gave him for dinner and that it did not hurt so much. I asked the staff nurse why they had done all that last night and she said, "They had to investigate him, nurse, to make an accurate diagnosis," but I do not think they know now whether the mutton bone is there or not. They still think "an œsophagoscope will finally be necessary to determine its presence or not." But I know he is getting better because I can see it in his face. Well, that is all for the present, I will tell you about my old man when I come home on Sunday.

Every your loving daughter,

FELICITY.

Since her mother showed me the letter I have been wondering which was the better report of the two.

TAKING NOTES

OF the making of notes there is no end, and of their varieties it is the same. There are the notes which tell the condition of a part and those which indicate the fleeting thoughts within the mind. There are the notes which hew the structure into form, and those which point the wisps of straw that tell the way the wind is blowing. In all clinical medicine there are two modes of approach—that which sorts out the possibilities by essential lines of cleavage, and that which settles down to narrow probabilities—and the notes that suit the one are not suited to the other. The busy doctor, going his round, may see twenty cases in a day of which one may be a grave one. He jots down notes in his car of the shortest kind, to indicate this gravity and to register the rest. The physician in his consulting-room may see six patients in a day, and none of them be serious, yet his notes run to many pages, for the cases have been sorted out by others and he must be certain of his points. The most mechanistic lesion may need the most subtle noting, while the neuropsychological case needs the crudest. There was the lady who had had twelve operations on the nose by different surgeons, all of whom had missed the fact that her husband brought his mistresses into her drawing-room and compelled her to receive them. Notes on the shape of the turbinals would not help in this case; but in a case of aphonia seemingly hysterical those on the structure of the nose may matter much. Then there are negative notes—how valuable these may be, but how we may overdo them—and it is nearly always the negative note we have not made which is the one we need. One point in a negative note that is essential is the date, perhaps the hour. To know a palsy of the face was not there at some unstated time in the patient's life means nothing. To know it was not there at 9 P.M. on Tuesday, May 28, 1940, may be essential.

The good note-taker is not necessarily a good doctor, though he may be able to estimate all the symptoms that may occur in any disease in percentages. He may well be a successful physician, for he can tell the patient's doctor all about her, while the bad note-taker may magnetise his patient into self-confidence and so back into health but will fail because he cannot write anything to the doctor. It is seldom that anybody's notes are of any value to anybody else who has to treat a patient, but there are two exceptions—negative facts in the subtle medical cases and positive ones in the crudely surgical. But they must be facts, and that calls for accuracy of observation.

Prof. C. F. M. Saint's little book called "Surgical Note-Taking" (H. K. Lewis, 3s.) deals with the latter type and leads us to make one critical remark. He writes from South Africa, and it is the practice there to denote the race by the patient's colour; but he is not consistent, for some of the notes start, "the patient, a coloured female, age 46," and others, "a male aged 56," from which one would infer that the latter belonged to the white races. This apparently is not so. But dressers and clerks will pick up some useful tips from him, and the more closely he approaches the crudely surgical the better he is as a guide.

LETTERS TO THE EDITOR

POSTERIOR-PITUITARY EXTRACT

SIR,—Dr. Archibald McLellan's interesting paper on the response of the non-gravid uterus to posterior-pituitary extracts in THE LANCET of May 18 (p. 919) raises several matters of clinical importance. As he kindly refers to earlier observations on the subject by myself, I should like to add to his remarks. Using an intrauterine bag technique, I showed (*Edin. med. J.* August, 1934, proceedings, p. 93) that vasopressin, and not oxytocin, was the factor responsible for causing contraction of the non-pregnant organ when these extracts were administered intramuscularly in customary dosage. Dr. McLellan has carried the work an important stage further by his quantitative studies. Through the kindness of Mr. Stanley White of Messrs. Parke Davis I also was supplied with specially purified "pitocin" and "vasopressin." My results were so surprising that I at first believed that the bottles had been wrongly labelled. A re-assay of the remainder of the contents confirmed the correctness of the stated concentrations of the two fractions; and subsequent work with other samples produced like results.

My findings at that time also led me to state that the non-pregnant uterus would contract (although in varying degrees and in varying manner, such as the slow spasm now mentioned by Dr. McLellan) at any stage of the menstrual cycle. I thus put myself at variance with Knaus and other workers who were at that time proposing to make an absence of uterine response a clinical test for determining the time of ovulation in the human subject. Strong criticism of my methods was made by Reynolds, and later answered by myself (*Lancet*, 1935, **1**, 53). More recently, E. M. Robertson (*Edin. med. J.* 1937, **44**, 20) and others have corroborated and augmented my findings. Although McLellan does not broach this subject, it is noteworthy that his charts and tables show that he also has found that the non-pregnant uterus will respond to posterior-pituitary extract at a time which presumably corresponds to the luteal phase of the menstrual cycle. Nevertheless, differences can be detected in the behaviour of the uterus according to the stage of the cycle. In the pre-ovulation stage the contractions as recorded by the intrauterine bag are frequent, irregular and of small excursion, whereas after the mid-point of the cycle they become increasingly "flat" and are interrupted by powerful contractions lasting for upwards of 60 seconds or more. The first type of contraction I have been in the habit of calling the A-type waves, and the second the B-type waves. During menstruation the B-type contractions are powerful, regular and very frequent.

Dr. McLellan draws attention to the importance of determining the response of the uterus to the posterior-pituitary fractions at various times throughout the course of gestation. For some years I have collected such information, making use of the opportunity offered when a therapeutic abortion becomes necessary. Thus far the observations are necessarily few in number, and do not warrant making a definite statement. It may be said, however, that Robson's observations (quoted by McLellan) on the behaviour of excised human uterine muscle are likely to be true also for the behaviour of the intact organ. At all events, the human uterus is remarkably resistant to both posterior-pituitary fractions in the early weeks of gestation, although curiously, if actual abortion is taking place, the uterus, which but a few hours before had been extremely refractory, will now respond promptly to injections of posterior-pituitary extracts. In the present state of knowledge there is good reason to insist that when posterior-pituitary extract is used to control hæmorrhage in cases of inevitable or incomplete abortion the plain extract should be given and not the purified oxytocic principle.

I am, Sir, yours faithfully,

Radcliffe Infirmary, Oxford. CHASSAR MOIR.

TREATMENT OF CEREBROSPINAL FEVER

SIR,—The report of the proceedings of the section of therapeutics of the Royal Society of Medicine in your issue of May 25 was most instructive. It would be interesting to hear more fully Dr. Banks's reasons for stating that sulphapyridine by mouth is the drug of first choice as against sulphanilamide. Is dosage the only factor? The first and final aim of chemotherapy would seem to be to raise the concentration of the drug in the body fluids rapidly to its effective level and keep it at that level for a sufficient length of time. A natural corollary is that the dosage interval is as important as the dosage.

Of the first 50 cases treated at the Isolation Hospital 4 died. All were treated with sulphapyridine four-hourly until the drug was stopped. In addition, fully half of the cases had meningococcal antitoxin intravenously in 10 per cent. dextrose by the continuous drip method. One of the cases so treated died, a man who was in the third week of his disease when admitted.

No-one will dispute Dr. Banks's most sensible and practical statement that treatment must be undertaken in skilled and experienced hands and isolation is of secondary importance. Nevertheless, cerebrospinal fever is an epidemic infectious disease and this fact should not be forgotten. The inference need not, I think, be further stated.

We are, Sir, yours faithfully,

T. LLOYD HUGHES,

Bebington, Wirral, Cheshire. H. F. HARWOOD.

SUGAR IN THE TREATMENT OF ULCERS

SIR,—Neither your Budapest correspondent in THE LANCET of May 4 (p. 826) nor Dr. Meyer in his letter of May 25 (p. 986) stresses the value of glucose in the treatment of bed sores. Glucose applications are particularly valuable in dealing with deep ulcers in patients who have anæsthetic areas from spinal lesions, as the other methods available for treating these are not very effective. In a patient recently under observation with neuromyelitis optica a deep ulcer developed while the patient was still anæsthetic. Packing the ulcer three times a day with powdered glucose led to a dramatic response, so that this enormous ulcer had almost completely healed before the anæsthesia had completely disappeared.

I am, Sir, yours faithfully,

Norwich. STEPHEN T. FALLA.

BLOOD-TRANSFUSION SERVICES

SIR,—No-one connected with any blood-transfusion scheme outside the Metropolis could but endorse fully Dr. Dyke's observations in his letter in your issue of June 1. Long before the war many of us formed a transfusion service capable of meeting the needs of large numbers of casualties and last September put this service on a war footing despite the vague and lukewarm encouragement of the Ministry of Health.

Personally we have grouped over 1000 donors from the town and nearly 500 from neighbouring urban and rural areas including not a few from the Services. Equipment for dealing rapidly with many donors has been assembled. A team of voluntary workers has on our own initiative been enlisted and trained, but even now we cannot be granted cars for transporting donors, and not even a petrol allowance is obtainable for this purpose. Most of us are only too glad to perform useful national work voluntarily, but we might expect coöperation if not financial assistance from official bodies. It seems unreasonable that London should be the sole recipient of official favour, and that the transfusion needs of the rest of the kingdom should be ignored. This appears to be the general position throughout the provinces, where it seems likely that heavy calls will be made on these services. If these are met successfully it will be because of the unsupported efforts of transfusion officers who have not allowed official apathy to stultify their efforts.—I am, Sir, yours faithfully,

E. BIDDLE,
Transfusion Officer, East Suffolk and Ipswich Hospital.

PURPURA HÆMORRHAGICA TREATED WITH VITAMIN P

SIR,—Dr. Gorrie's interesting article in your issue of June 1, in which the value of vitamin P is implied, calls for comment. In a recent editorial on vitamin P in the *Journal of the American Medical Association* (Jan. 6, 1940, p. 43) it was stated that Szent-Györgyi obtained negative results when he repeated his earlier experiments on the basis of which the existence of vitamin P was first claimed. In Dr. Gorrie's case the hæmaturia ceased almost completely after giving vitamin P, yet in contrast Gimsing (quoted in *Brit. med. J.* 1939, **1**, Key to medical literature, p. 108) found vitamin P disappointing in 7 cases of hæmorrhagic nephritis. Unlike Jersild, my own results with vitamin P in purpura have hitherto been negative.

I am, Sir, yours faithfully,

St. Stephen's Hospital, S.W.10. ELI DAVIS.

FOOD PRESERVATION

SIR,—In the early weeks of the war the Government relaxed the statutory rules regarding preservatives in food to the extent of permitting the use of sodium nitrite and potassium nitrite in bacon, ham and pickled meats. This was a token of the severity of the regulations which have been in force since 1927. Sausage, fresh and dried fruit, jam, marmalade and cornflour almost exhaust the list of the solid foods in which the use of preservatives is allowed by the regulations of 1927, and in some cases the addition of sulphur dioxide allowed is so small as to be practically useless. An example is seen in jam, for although the use of 40 parts per million of sulphur dioxide is permitted, jam makers in general make their jams without it.

Besides sulphur dioxide, the other preservative permitted under the 1927 rules is benzoic acid and this may be used, in minute specified quantities, in certain non-alcoholic wines, sweetened mineral waters, brewed ginger beer, coffee extract and pickles and sauces made from fruit and vegetables. Thus the foreign substances permitted are limited to sulphur dioxide and benzoic acid.

In some countries the use of measurable traces of boric acid, borax and salicylic acid is sanctioned and the question arises whether, in view of the extreme necessity to prevent food wastage, it would not be in the national interest to amend the regulations so as to allow the use of these substances—regarded by the governments of some countries as virtually innocuous in the weak dilutions which answer this purpose—in certain foodstuffs while the emergency lasts. I am advised that it is hardly feasible for any of these substances to be employed for the purpose of concealing incipient decomposition or to disguise staleness and putrefaction, which prior to 1927 was the purpose to which formaldehyde was sometimes put. The reintroduction of formaldehyde is not suggested, but I submit that an extension of the applications of sulphur dioxide and benzoic acid and the restoration of salicylic acid, boric acid and borax might be considered as a temporary expedient.

The installation in this country of refrigerators in houses, and especially in luxury flats, has made considerable headway in recent years, but the majority of dwellings have no refrigerating system. Spells of hot weather may be close upon us and food wastage is no longer an affair of the individual conscience but an offence against the whole community. Not a scrap of food should be allowed to become putrid or a pint of milk sour, and that is why I venture to suggest that some reasonable latitude should now be authorised to help us to conserve all the food we buy. Since the use of preservatives in cream was entirely prohibited large volumes of this valuable food have been wasted, and it is asserted that much tainted cream has been consumed, to the discomfort of its consumers. Which is the more harmful, cream that has lost its freshness, or cream kept fresh with the aid of innocuous preservatives?

A related matter is the milk problem. Is it not better to heat milk and ensure its freshness for an extra day rather than pour it down the sink? It is agreed, I believe, that heat even when carefully applied, as in the process of pasteurisation, may impair the antiscorbutic vitamin in milk, but the deficiency of vitamin C can readily be corrected with lettuce or fruit; and after all one has little thought for vitamin C when boiling the milk for the breakfast coffee or making a rice pudding. Being not unfamiliar with the historical place THE LANCET takes in the reform of our food laws I feel as anybody but a Daniel must feel on the threshold of a lion's den. But please understand that the suggestion is merely that for the period of emergency only the regulations as to the use of preservatives in food should be remodelled under expert supervision.

I am, Sir, yours faithfully,

Whitehall Place, S.W. 1. F. C. GOODALL.

SUPPLY AND DEMAND

SIR,—The leading article in your issue of May 25 raises questions of paramount importance not only to the profession but to the state. As you insist, this is a "total" war. There is a limited number of doctors to supply the needs of the forces and the civil population. The violence of the war is rapidly increasing, and casualties must increase also; this means more doctors for the forces. Ere long the country will have to face the certainty of a scarcity of doctors—even now there is a scarcity of specialists in certain branches of surgery—e.g., thoracic, neurological, and orthopædic. To make the most of our limited resources there must be some kind of conscription of the whole profession—labour is conscripted; why should we be exempt? That there is need of a comparatively small nucleus of trained administrators in each of the services, military and civil, there is no doubt. The rest of us should form a pool on which all the services can draw. There should be a "medical" uniform

common to all services. The members of the pool should be transferable from one service to another, from one part of the country to another, and from one country to another as need arises. There should also be a new census of the profession, whether serving at the moment or not, so that any special qualifications possessed by a man could be used to the best advantage, which is, unfortunately, not the case today.

That some such scheme will come into being is certain—force of circumstance alone will bring it to pass. It will be far better for the profession and the state alike if we demand it. Only there must be no delay. After the war we can thing again.

I am, Sir, yours faithfully,

London, W.1. PHYSICIAN.

SIR,—The medical examination held for prospective R.A.M.C. officers is not very severe or searching but it is nevertheless incongruous that approximately the same standard of physical fitness is expected from middle-aged practitioners as from young and recently qualified men. Surely this service should adopt the common-sense method used by the rest of the army and grade doctors in medical categories, apportioning to each man work that he is best capable of, thereby making the most use of all available material. This method would not only avoid injustice, such as elderly men having more strenuous work than younger and fitter men, which I assume must now be a matter of chance, but would enable the army to make use of volunteers now rejected for relatively trivial reasons. It does not seem to me, from recent personal experience, that the army authorities yet realise that every doctor will not be called upon to do the physical work of a combatant officer, or that every available doctor will soon be needed. It may be interesting to reflect that the late Lord Nelson or General Carton de Wiart, however good and efficient doctors they might be, would be instantly rejected for *any* service by a present army medical board.

I am, Sir, yours faithfully,

UNDER THIRTY.

OBITUARY

MATTHEW YOUNG

M.D. GLASG., D.SC. EDIN., D.P.H.

Dr. Young was one of those self-effacing altruists who go through life trying to hide their light under a bushel. Fortunately in this he was largely unsuccessful. Everyone with whom he worked appreciated the sterling qualities of the man: his industry and thoroughness, the width and depth of his knowledge, his keen scientific insight, his honesty and courage which were always infused with kindness. Everyone trusted him as a friend and as a scientist, for no worker more readily placed his gifts at the disposal of others. Young's own splendid record of published work—in anatomy, anthropology and biometry—was only equalled by what he did, quietly and unobtrusively, on behalf of his colleagues and friends, and he was able to raise the standard of medical research in this country by insisting on the proper biometrical treatment and interpretation of numerical data.

He came of good Ayrshire farming stock, and was educated at Kilmarnock Academy and Glasgow University, where he graduated M.B. with honours in 1907. After a year in general practice at Thirsk he returned to Glasgow as junior and later senior demonstrator in anatomy at the university. In 1915 his M.D. thesis on the Scottish skull won for him the Bellahouston and Struthers gold medals. In the same year he joined the staff of the Medical Research Council and until 1922 he was engaged, under the direction of John Brownlee, in supervising the tracing and statistical analysis of the case-records of all the officers and men who had been admitted to casualty-clearing stations or hospitals during the last war. This enormous task provided invaluable data as to the results of different forms of treatment, and made it possible for surgeons working near the front line to be kept informed of the histories of cases in which they were specially interested. The records, which included more than 22 million index cards and a quarter of a million detailed case-sheets, were later transferred to the Ministry of Pensions. In 1922 he was appointed to the permanent staff of the council for work under Brownlee in the statistical department which then formed part of the National Institute for Medical Research. After Brownlee's death in 1927 he was transferred to the council's external staff and attached to the institute of anatomy at University College, London, where he was able to resume those anatomical and anthropological studies which the accident of war had interrupted. He was an honorary lecturer there and he spent many an hour in teaching, for pleasure, senior students of physical anthropology as well as lending a hand on busy days among the juniors in the dissecting-room. Since the outbreak of the present war he had been working in Professor Greenwood's department at the London School of Hygiene. He had been in indifferent health for some two years and in January he went down with an attack of pleurisy. Since then he had been confined to bed and his general state slowly but inexorably deteriorated.

Young's more important publications, alone or in association with other workers, deal with such various subjects as the incidence of cancer in relation to occupation and locality, the nature of status lymphaticus, the growth of the face and jaws in children, the statistics of appendicitis, and the relation of iodine deficiency to thyroid disease. He was a member of the Medical Research Council's committees on dental disease and on statistics, and he was personally responsible for the biometrical and statistical analysis of the data, collected at Birmingham by the former committee, on the relationship of dietary deficiency to dental caries in children. In the spheres of pure anatomy and anthropology, he published a number of interesting studies of the skulls of ancient man.

Sir Edward Mellanby writes: Young was a man of wide scientific knowledge and his researches and publications cover so extensive a field that it is difficult even to summarise them concisely. Although he did valuable work in medical statistics, he never wished to be regarded purely as a statistician; his own, sufficiently comprehensive, description of his subjects of work was "medical problems of an anatomical and anthropological nature." Apart from his wide knowledge and great ability, Dr. Young had two outstanding qualities which made him the perfect collaborator. The first was his desire to help all investigators and his willingness to participate in many divergent studies, and the

second his reliability. These qualities were of exceptional value to medical science, and the large number of calls for his help made upon him by the Medical Research Council can be judged by the numerous instances in which he has published accounts of extensive inquiries in association with others. His death is a severe loss to the council.

Dr. Young leaves a widow and a young son and daughter.

JOSEPH WILLIAM LEECH

KT., M.S. DURH., F.R.C.S.E., M.P.

Sir Joseph Leech, who died suddenly in his 75th year on May 30 had taken an active part in the professional, municipal and parliamentary life of Newcastle-on-Tyne. His own life was full of hard work, interest and goodwill, and deserved success, with a sudden passing just as he would have wished.

A native of Cumberland, he migrated to Newcastle early in life, received his medical education there at the University of Durham college of medicine, graduating M.B. in 1887. He later proceeded to the degrees of M.D. and M.S. and in 1900 obtained the diploma of F.R.C.S.E. There must be few parallels with the sequel, for Leech became a successful surgeon despite the fact that he never held a resident hospital appointment: he was a self-taught surgeon albeit a really good one.

After a short period of general practice he decided to specialise and was successively assistant surgeon, surgeon and consulting surgeon to the Royal Victoria Infirmary, Newcastle-on-Tyne; senior surgeon and consulting surgeon to the Newcastle Throat and Ear Hospital. He served throughout the last war as major R.A.M.C. (T.F.) in the 1st Northern General Hospital.

Leech was a man of engaging personality and ferocious energy who put his utmost into anything he undertook. As lecturer and examiner in clinical surgery at the college of medicine he always had a large following of students, and those who benefited will ever have a kindly memory of his forceful methods of instruction. He drove a sound knowledge of surgery into his students by constant reiteration, and as a man of the world he also taught them the successful handling of patients.

In 1926 when he retired from the active staff of the Royal Victoria Infirmary he also began the second part of his career by becoming a member of the Newcastle city council. He was sheriff in 1930–31 and lord mayor in 1932-33: in both of these positions he was an outstanding success for he more than upheld the dignity of the office. He was a good speaker and was always well groomed, while his white hair and white moustache gave him an appearance of some distinction. Parliamentary life attracted him and since 1931 he sat as unionist M.P. for the west Newcastle constituency. He was the first member of Parliament to be, at the same time, lord mayor since 1790. During his busy life he found time to qualify as a barrister and was a member of the Middle Temple. In 1934 the university of Durham conferred on him the honorary degree of D.Ch. In 1938 he was knighted in recognition of his public services. In Newcastle itself he had many contacts and a colleague writes: "Many will remember Leech as honorary secretary of the now amalgamated Newcastle Clinical Society. He had novel methods for the staging of its annual dinner, and all knew his subterfuge when stalking a 'victim' of first pulling out from one waistcoat pocket a cigarette for acceptance, followed by the appearance of a dinner ticket from another waistcoat pocket: but the number of tickets sold was always large and the dinner, under his sway, an invariable success." He was also ex-president of Durham Medical Graduates' Association and a senior fellow of the Association of Surgeons of Great Britain and Ireland.

Sir Joseph married Elfreda Louisa, daughter of the late Walter-de-Lancey Willson, of Kirklinton Park, Carlisle, and she survives him. There were three sons, one who predeceased him was a flight-lieutenant in the R.A.F., and of the others, one is a major in the Northumberland Fusiliers, while another is in business in the Far East.

Of his Parliamentary life a fellow-member writes: Sir Joseph's interests were mainly centred in the affairs of the city of Newcastle and he was a member of the group of North-Eastern M.P.s who kept all political and social matters in that region under their eye. To his whips he was a diligent and very keen member, always willing to help and willing always if called upon to travel from the north to take part in a division. His chief personal characteristics were kindness and humanity. Behind him he leaves the memory of a great gentleman.

RUBENS WADE

M.R.C.S.

Dr. Wade, who died on May 30 at the age of 60, was well known as an anæsthetist. For several years his work had been interrupted more than once by failing health, but on each occasion he seemed to make a good recovery and went back to his duties with renewed energy. But soon after the war began, and before he could get into the swing of the new conditions, he was again struck down.

Born at Applethwaite, the son of Thomas Wade the artist, he was educated at Sedbergh and Christ's College, Cambridge, taking his clinical course at St. Bartholomew's Hospital from which he qualified in 1906. His inclination was towards general practice in the country, but a defect of hearing led him to choose the career of an anæsthetist. During the last war he was attached to the military hospital at Sidcup, acting as anæsthetist to the facial surgery unit there. After demobilisation he joined the honorary staff of St. Bartholomew's and the Royal Northern hospitals. Although holding such important posts Wade was less known than he should have been to anæsthetists in general. This was due partly to his quiet and unobtrusive nature but more especially to his defective hearing which made it quite useless for him to attend anæsthetists' gatherings. A colleague writes: "The only time that I ever remember seeing him at a meeting of the anæsthetics section of the R.S.M. illustrated well his innate courtesy and kindly feeling for his friends. I was reading a paper and afterwards asked him whether he had been able to hear me. He replied, 'Not a word. I did not expect to, but I thought it only right to come and support

a friend and colleague.' It was this same deafness, I believe, which many years ago led him to give up other branches of medicine and take up anæsthesia. In this particular line he would say, with a twinkle in his eyes, hardness of hearing was not always a disadvantage, especially with a difficult or irritable surgeon!"

Except for one or two papers on anæsthesia in plastic and facial surgery he wrote little. He was devoted to the interest and safety of his patients among whom he was a great favourite for they quickly realised that he would spare no effort for their comfort and wellbeing. There was no humbug about him and his sterling honesty was never better illustrated than when on one occasion a tragedy befell. Although it was really no fault of his, he insisted on assuming the entire responsibility and allowing no share of blame to fall on others.

In 1912 he married Phyllis Mary Landon, who died a few months ago. They had one son.

Sir Harold Gillies writes: In the passing of Ben Wade those who had the privilege of working with him have lost a real friend endowed with a kindly personality that endeared him to all. Neither the long-continued consumption of anæsthetic fumes nor his increasing deafness in any way impaired his good temper. Inefficiency, however, he would not tolerate in others or himself. The rapid strides that anæsthesia made during the latter part of the last war were largely due to his untiring and intelligently directed efforts to provide a safe and satisfactory anæsthesia for severe facial wounds. In 1916 the first improvement suggested by Colonel J. F. W. Silk, then consultant anæsthetist to the army, was adopted of operating on these jaw cases in the sitting position, when a very light mixture of chloroform and oxygen was administered through the nose or mouth. Wade (as well as the surgeons) adapted himself to this strange method. Another improvement was the introduction of the Kahn's tube and the nasal intrapharyngeal methods. Later the positive pressure intratracheal was adopted, and later still the two-tube intratracheal method—the forerunner of that used at the present day. In all these methods Wade was absolutely sound and reliable and he definitely upheld the school of anæsthetists that have added so much to the reputation of this country by choosing the type of anæsthesia best adapted for the particular patient and the particular operation. Judgment was added to technical skill. At St. Bartholomew's, in particular, his delightful presence will be sorely missed.

CLARENCE EDWARD WIGAN

M.B. ABERD.

Dr. Clarence Wigan, who died at Rock, Cornwall, on April 5, was born at Portishead in 1864. After leaving Bristol Grammar School he studied to be an electrical engineer, but later decided to follow his father's profession, entering Charing Cross Hospital as a student, and taking his M.B. at Aberdeen University in 1891. He began practice in Clevedon, Somerset, and was the first man in the west country to make use of the Röntgen rays. Following his original bent in physics, he began to work out electrical treatment on practical lines in contrast to the somewhat empirical methods used at that time. After two years he moved to London where he developed his technique in electrotherapy, especially in the combined use of faradic and galvanic currents. In the selection of conditions suited to this latter treatment he was anticipating the response nowadays to diathermy and the sinusoidal current. During the last 18 months his work had been interrupted by illness, though he had been able to return at intervals to attend to those who demanded his care.

Mr. F. J. STEWARD, consulting surgeon to Guy's Hospital, died at Kingswood on May 31.

We also regret to announce the death in Flanders during May of Major LAURENCE O'SHAUGHNESSY.

Medical Diary

Week beginning June 10

ROYAL SOCIETY OF MEDICINE, 1, Wimpole Street, W.1.

TUESDAY

Therapeutics and Pharmacology—2.30 P.M., Mr. A. J. Ewins, D.Sc., Dr. E. C. Butler, Dr. H. M. McCrea, and Dr. G. Melton: Clinical Experiences with Sulphathiazole in Therapy of Staphylococcal Infections.

Psychiatry—4.30 P.M., Dr. E. N. Butler: Observation Units. Dr. J. S. I. Skottowe, Mr. R. H. Curtis and Dr. Letitia Fairfield will also speak.

FRIDAY

Ophthalmology—5 P.M., annual general meeting. Mr. J. P. Maxwell: Cataract in Osteomalacia.

MEDICAL SOCIETY OF INDIVIDUAL PSYCHOLOGY.

THURSDAY—2.30 P.M. (11, Chandos Street, W.1.), Dr. J. A. Hadfield: Sexual Fetichism—Its Psychopathology and Treatment.

BRITISH POSTGRADUATE MEDICAL SCHOOL, Ducane Road, W.12.

MONDAY—10 A.M., opening of special course on chest surgery.

TUESDAY—2.30 P.M., Sir Walter Langdon-Brown: ward clinic.

WEDNESDAY—11.30 A.M., clinico-pathological conference (medical). 2 P.M., Dr. Janet Vaughan: pregnancy diagnosis tests. 3 P.M., clinico-pathological conference (surgical). 4.30 P.M., Prof. G. R. Cameron: Pathology of the Liver.

THURSDAY—2 P.M., Dr. Duncan White: radiological conference.

FRIDAY—2 P.M., clinico-pathological conference (gynæcological). 2.30 P.M., Mr. V. B. Green-Armytage: sterility clinic.

DAILY—10 A.M.–4 P.M., medical clinics; surgical clinics and operations; obstetrical and gynæcological clinics and operations. 1.30–2.30 P.M., post-mortem demonstration.

FELLOWSHIP OF MEDICINE AND POSTGRADUATE MEDICAL ASSOCIATION, 1, Wimpole Street, W.1.

London Chest Hospital, Victoria Park, E.2. WED. and FRI., 6 P.M., M.R.C.P. course in heart and lung diseases. West End Hospital for Nervous Diseases, Gloucester Gate, N.W.1. MON. to FRI., afternoon, M.R.C.P. course in neurology.

Appointments

BLAIR, R. H., M.B. Lpool, hon. physician to the Redruth Hospital.

BUNTING, M. ELIZABETH, M.B. Lond., D.A., anæsthetist at the Royal Hospital, Sheffield.

CORNER, LANCE S., M.B. Sydney, registrar at the Central London Throat, Nose and Ear Hospital.

EDWARDS, PHYLLIS, M.B. Lond., resident medical officer at Redhill County Hospital, Edgware.

EVANS, HORACE, M.D. Lond., F.R.C.P., hon. physician to the Royal Bucks Hospital, Aylesbury.

HALE, L. W., M.D. Lond., M.R.C.P., hon. physician to the Redruth Hospital.

LLOYD, F. H., M.D. Florence, M.R.C.P. Lond., resident assistant medical officer at the West Middlesex County Hospital, Isleworth.

POWYS, MARJORIE, M.B. Lond., D.R.C.O.G., resident assistant medical officer at the Middlesex County Maternity Hospital, Bushey Heath.

SULLIVAN, E. M., M.B. N.U.I., assistant resident medical officer at Erdington House, Birmingham.

WALMSLEY, G. H. C., M.B.Manc., D.P.H., tuberculosis officer and assistant medical officer for Brighton.

WILLIAMS, R. S. HUNT, M.B. Camb., F.R.C.S.E., registrar in the ear, nose and throat department of the Queen Elizabeth Hospital, Birmingham.

London County Council Mental Health Service.—The following appointments are announced:

HILL, J. D. N., M.B. Lond., M.R.C.P., D.P.M., temporary specialist at Sutton Emergency Hospital;

JOSEPH, H. S., M.B.Lond., D.P.M., temporary medical officer at Sutton Emergency Hospital;

REES, W. L. L., M.B. Wales, temporary medical officer at Mill Hill Emergency Hospital;

THORLEY, A. S. M.D. Lond., D.P.M., temporary medical officer at Sutton Emergency Hospital.

Examining surgeons under the Factories Act, 1937: Dr. W. G. Owen (Penygroes, Caernarvonshire); Dr. A. B. Stich (Brenchley, Kent); Dr. H. L. Sells (Market Bosworth No. 1 district, Leicestershire).

PARLIAMENT

ON THE FLOOR OF THE HOUSE

By MEDICUS, M.P.

BETWEEN Tuesday of last week when the Prime Minister made his statement "that the King of the Belgians yesterday sent a plenipotentiary to the German Command asking for a suspension of arms on the Belgian front" and Tuesday of this week lies a world of thoughts, actions and intense feeling. Then we were warned to be prepared to hear "hard and heavy tidings"; now we have heard tidings not of the greater disaster which appeared impending, but of a miracle of deliverance. In the course of that deliverance, however, we have lost transport vehicles, armoured vehicles and a thousand guns. To make up that loss will cause a delay in supply and it is a colossal loss. Channel ports lost, important industrial areas, mines and factories in the hands of Germany, the Belgian Army of nearly half a million men—"the best army Belgium ever had"—in enemy hands.

A secret session is to be held, probably on next Tuesday, when the House will discuss the now paramount question of Home Defence; for the danger of invasion, often threatened, must be treated as a reality and all our power used to prevent it. The Fifth Column, not aliens alone, is to be stamped out.

* * *

Mr. Churchill stated our losses in killed, wounded and missing at 30,000 men and to many members this seemed a figure lower than had been expected. Even this figure may be reduced as some of those listed as missing may reappear. But whatever betides, "on our sea power, and on our air power we shall ride out the storm." When Mr. Churchill paid his tribute to the splendid youth of the Air Force whose exploits surpass those of the Crusades or the Age of Chivalry his voice trembled for a moment and for an instant he hesitated. The story was grim but even if these islands were invaded, as the Prime Minister did not believe, even then the war would be continued under the sheltering power of the Navy from the Empire overseas. It is a world war in the literal sense in which we are engaged, a war in which there can be no neutrals, for neutrality has no meaning except opportunity for the aggressor.

* * *

A stern cheer of approval greeted the Prime Minister as he sat down and this was followed by a confused incident in which Mr. Lees-Smith rose to make "a few appropriate remarks," but the House would not listen and by direction of the Speaker Mr. Lees-Smith sat down. The importance of this incident is that Mr. Lees-Smith has been elected chairman of the Labour Party committee and has been occupying the seat on the front Opposition bench traditionally reserved for the leader of H.M.'s Opposition. But there is no opposition in the literal sense of the term, and whether any opposition arises remains to be seen. His Majesty's loyal Opposition is in fact so much a part of our constitution that the machinery of the House of Commons moves creakily without it. Last week Mr. Herbert Williams, a Conservative formerly holding ministerial office, was able to secure a supply day when supported by some Conservative back-bench members. This last Tuesday Mr. Maxton challenged Mr. Lees-Smith's right to speak after the Prime Minister's statement and members from all parts of the House, if not vocal, were audible. Captain Bellenger, a Labour M.P. in uniform just returned from the B.E.F., claimed his right to speak if a debate was to be held and there were other less articulate interjections. Although the House had a whole list of bills to deal with on Tuesday last the business was all disposed of before 6 P.M. and younger men in Parliament were making arrangements to change from civilian dress to army uniform. Mr. Oliver Stanley, the former Minister of War, has joined up and is now a lieutenant. Others will be doing the same.

* * *

But the work of Parliament goes on. A grave difficulty has arisen with regard to an excess supply of cocoa in West Africa over and above what the present markets can absorb or shipping space transport. It has therefore been proposed to destroy by burning or dumping into the sea £300,000 worth of cocoa which has already been paid for out of money provided by the British taxpayer. By the irony of politics the announcement of this fell to the lot of a Labour parliamentary secretary whose party has often furiously denounced food and crop destruction—coffee in Brazil and cotton in the U.S.A., for instance—as a sign of the decrepitude of capitalism. A number of members are determined if they can to find a way out of this difficulty even if it means giving the cocoa away.

Matters of this kind, questions of public health and the nutrition of the nation, the guarding of freedom of speech and criticism, and, above all, questions of the supply of war-materials—guns, munitions, aeroplanes—all these matters will come before Parliament. The administrative side of Parliament may be reduced to the essential elements of necessary stages of legislation, but the critical and revising function of Parliament is likely to reassert itself and to be of great value to the national effort we are making and which we must make as free men.

QUESTION TIME

Inoculation of Civil Population

Mr. H. J. PARKER asked the Minister of Health whether steps would be taken to inoculate the civilian population beginning with civil defence and other key-workers, against typhoid and tetanus, in case of the danger of epidemics following serious air-raids.—Mr. A. MACDONALD replied: I do not think that any such general inoculation of the civilian population is practicable or indeed advisable. Inoculation may, however, in particular circumstances and for some diseases be of value, and facilities are available for anti-typhoid and anti-tetanus inoculation where required.

Bombing of British Hospital Ships

Captain L. F. PLUGGE asked the Prime Minister whether, in view of the bombing of British hospital ships he would consider effective reprisals in some form or another against action of this kind.—Mr. C. ATTLEE, Lord Privy Seal, in reply said: The bombing of hospital ships and the machine-gunning of ambulances in France might be taken, in conjunction with the deliberate attacks by German aircraft on refugees on the roads of Belgium and France, as typical of the methods of terrorism being pursued by the German government. H.M. Government held themselves free to take such action as they might consider appropriate, but it was not their intention to exact retribution from the wounded or from women and children.

Women Specialists in Medical Services

Dr. E. SUMMERSKILL asked the Secretary of State for War whether he had now decided to include women

specialists in the medical services for the care and treatment of women auxiliaries.—Mr. R. K. LAW, Financial Secretary to the War Office, replied: It is not considered necessary to appoint women specialists in the medical service of the Army for the specific duty of treating women auxiliaries, in addition to the specialists already available. Women doctors employed in the Army are eligible for specialist appointments. Dr. SUMMERSKILL: Why is there this discrimination against women? Mr. LAW: I do not think there is any discrimination against women as such. It is the purpose of the authorities to get the best available medical attendance for members of the forces, irrespective of sex.—Dr. SUMMERSKILL: Is there in the Army any prejudice against women? Mr. LAW: I am sure there is no such prejudice.

Medical Practitioners and Military Service

Mr. T. E. GROVES asked the Parliamentary Secretary to the Ministry of Labour and National Service having regard to the procedure prescribed by the Minister of Health relative to the liability of medical practitioners for service with His Majesty's forces in the circular letter to insurance committees, dated May 11, 1940, in which no reference was made to a doctor's right of appeal on the ground of hardship, he could give an assurance that such right of appeal existed, and that no appeal would be rejected solely on the ground that the Central Medical War Committee had recommended the call-up of the appellant.—Mr. R. ASSHETON replied: Medical practitioners who are called up under the National Service (Armed Forces) Act have the same right as other persons so called up to apply for postponement on the ground of exceptional hardship. The function of the Central Medical War Committee is to advise as to the extent of civilian needs for medical practitioners, and there is no reason to suppose that the statutory authorities will reject applications for postponement because the Central Medical War Committee has recommended that the services of the applicant need not be retained for civilian needs.

Visits of R.A.M.C. Officers Overseas

Mr. GROVES asked the War Minister whether he would consider, in the interests of efficiency of the medical services, making it possible for medical men with the forces who had little or no experience of military medical work either to make visits to the forces overseas in order to learn at first-hand precisely the conditions prevailing or to receive courses of instruction from medical men with overseas military experience.—Mr. A. EDEN replied: It is a principle in the medical services of the Army that all medical officers receive the maximal amount of military medical instruction compatible with the rate of supply of these officers from civil sources and the military demands for their services with military units A number of medical officers from home commands have visited overseas units in order to see the conditions in which these units are working.

Alien Doctors

Mr. T. E. GROVES asked the Home Secretary whether he would favourably consider imposing a condition in respect of those alien doctors of enemy nationality, including refugees, who had been and might be permitted to practise in Great Britain, that, when within the age-groups of British subjects compulsorily called up for service, the continuance of their permit was contingent upon their undertaking some form of national service and upon their not practising to the prejudice of the absentee British doctors.—Sir JOHN ANDERSON replied: I have no doubt that the majority, if not all, of the foreign doctors would be willing to undertake some form of national service in their own profession, but my information is that the medical profession would not look with favour upon this proposal. In pursuance of the Emergency Powers (Defence) Act, 1940, these foreign doctors like other people may be required to place their services at the disposal of His Majesty, and there will be power to utilise their services in any way which may be found appropriate in the national interest.

Sir ERNEST GRAHAM-LITTLE asked the Home Secretary what was the composition of the Home Office advisory medical committee dealing with the admission to Great Britain of foreign medical practitioners; who was the secretary of this committee; what was the total number of foreign medical practitioners entering this country since the German invasion of Austria in March, 1938, who had been placed on the medical register and allowed to remain in this country without such registration, respectively; how many of these were of German, Austrian or Czecho-slovakian nationality, respectively; and whether any precautions were adopted, or were now in operation, to prevent enemy agents from being included in these admissions and allowed to remain at liberty.—Sir JOHN ANDERSON replied: After the invasion of Austria and Czecho-Slovakia my predecessor, after consultation with the medical profession, decided that fifty Austrian and fifty Czech refugee doctors might be allowed, provided they obtained a British medical qualification, to practise in this country. Of these hundred persons only four, all of whom are Austrians, have as yet obtained a British medical qualification. The bona fides of all the doctors so admitted to this country was carefully tested before they were allowed to come here, and since the outbreak of war each case has been examined by one of the tribunals appointed for the purpose. The committee which advised the Home Office in the selection of these doctors consisted of the following persons: Sir Robert Hutchison (chairman), Sir Cuthbert Wallace, Sir William Willcox, Dr. J. C. Anderson, Sir Girling Ball, Dr. P. M. d'Arcy Hart, Prof. Samson Wright, Mrs. M. Ormerod, and Mrs. Y. Kapp (secretary).

Fees for Air-raid Casualties

Mr. GROVES asked the Minister of Health whether he was aware that at its last meeting the local medical and panel committees for the county of Kent unanimously approved a resolution declaring that a sufficient domiciliary medical service could not possibly be given to persons injured in air-raids for the sum of 16s. a year; and whether action would be taken to meet this point.—Mr. MACDONALD replied: This resolution has not been reported to me, but in any case I see no reason for departing from the scheme which was accepted on behalf of the profession as a whole.

Dental Mechanics

Mr. W. A. BURKE asked the Parliamentary Secretary to the Ministry of Labour and National Service if the committee of inquiry into the conditions of labour of dental mechanics had yet issued a report.—Mr. ASSHETON replied: I am informed that the report of the committee set up by the professional associations regarding dental mechanics is almost completed.

Evacuation of Old People

Mr. ROBERT MORRISON asked the Minister of Health if he would arrange an evacuation plan for old people.—Mr. MACDONALD replied: Plans for the evacuation of school-children are already taxing accommodation in the reception areas very severely, and I am afraid that it is not practicable to include within the Government's evacuation scheme special arrangements for the removal of large numbers of old people.

Blood-transfusion Services

Mr. ROSTRON DUCKWORTH asked the Minister whether sufficient supplies of blood for transfusion had now been guaranteed; and, if not, whether he could make a detailed statement on the subject to ensure adequate public response.—Mr. MACDONALD replied: Special measures have been taken in the London area and a number of large provincial centres to obtain a sufficient supply of blood for transfusion, and I have no reason to think that the general position is unsatisfactory.

Cash-and-Carry System for Milk

Dr. E. SUMMERSKILL asked the Minister of Agriculture whether he intended to make cheap milk available by eliminating the high cost of distribution and introducing the cash-and-carry system advocated by authorities on dietetics.—Mr. R. BOOTHBY, Parliamentary Secretary to the Ministry of Food, replied: The Minister has been discussing these questions with the milk distributors and a statement of Government policy will be made shortly.

Nutritive Value of Bread

Major W. H. CARVER asked Mr. Boothby whether he was satisfied with the present position with regard to the nutritive value of bread generally sold to the public in this country; whether he had yet been able to consider the recommendation sent to him by a group of members of the House of Commons interested in the scientific aspect of this matter; and whether he proposed to take any steps in the matter having regard to the desirability of enabling the public to obtain the maximum nourishment from bread. Mr. BOOTHBY replied: The whole question of the nutritive value of bread is now under consideration and I am not at present in a position to make any statement.

Sir FRANCIS FREMANTLE: Has this question not been settled twenty years ago?—Mr. BOOTHBY: Not so far as I am aware.

Treatment of Tuberculosis in Scotland

Mr. W. GALLACHER asked the Secretary of State for Scotland what was the number of beds reserved for tuberculosis in Scottish hospitals and sanatoria, and available for immediate occupation; also the number of such beds expressed in a percentage of annual tuberculous deaths for Scotland.—Mr. ERNEST BROWN replied: The desired figures are 4,300 beds and 122 per cent.

MEDICAL NEWS

University of Cambridge

Prof. F. J. Browne has been appointed a substitute examiner in midwifery for part I of the final M.B. examination in June in place of Mr. Frank Cook who is unable to act.

Changes in the regulations for the diploma in medical radiology and electrology made in 1937 shortened the course for this diploma from 9 to 6 months. It was found that this shortened course gave insufficient time for teaching physics for part I and diagnostic clinical radiology for part II. It has therefore been decided to return to the normal course. It had also been agreed to discontinue the diploma in 1941, but the Director-General of Army Medical Services has pointed out that this would seriously affect the training of radiologists for the R.A.M.C. The examination will therefore continue to be held till the university determines otherwise.

Society of Apothecaries of London

At recent examinations the following were successful:

Surgery.—C. Cotterill, N. P. Desai, B. Gallivan, A. G. Hick, and F. G. Pattrick.

Medicine.—C. Cotterill, D. S. Edwards, G. G. France, A. G. Hick, K. W. N. Palmer, and W. E. Whaite.

Forensic Medicine.—C. Cotterill, D. S. Edwards, G. G. France, A. G. Hick and K. W. N. Palmer.

Midwifery.—C. Cotterill, R. G. Feast, A. G. Hick, and C. H. Wood.

The following candidates, having completed the final examination, are granted the diploma of the society entitling them to practise medicine, surgery and midwifery: C. Cotterill, Sheff.; N. P. Desai, Bombay and W. Lond.; D. S. Edwards, Middlesex; R. G. Feast, Birm. and Roy. Coll. Edin.; G. G. France, Camb. and Guy's; and A. G. Hick, Leeds.

University of Liverpool

At recent examinations the following were successful:

D.T.M.—C. W. Hossack, I. Kitchlew, and T-L. Tan.

D.T.H.—M. P. Browne, E. S. Dismorr, Frances Dooley, J. M. French, D. B. George, M. H. Hafezi, Rebecca Koshi, I. H. Marrable, J. D. Munroe, I. Soorani, and H. Stott.

Royal Faculty of Physicians and Surgeons of Glasgow

At a meeting of the faculty on June 3, with Mr. Roy F. Young, visitor, in the chair, Dr. R. W. Crocket (Penshurst, Kent) and Dr. A. L. Goodall (Glasgow) were admitted to the fellowship. Mr. A. D. McIntyre, L.D.S., was admitted a higher dental diplomate of the faculty.

British Orthopædic Association

At the annual meeting of the association on May 3, over which Prof. T. P. McMurray presided, several short papers were read during the morning. Mr. W. R. D. Mitchell (Liverpool), from his results in 169 patients with tuberculous arthritis of the ankle and tarsus, recommended prolonged and conservative treatment in children, but amputation without delay in adults, for he said that in them tuberculous lesions were apt to appear in other parts of the body after conservative treatment of the original focus. Mr. Robert Stirling (Edinburgh) had obtained good results in 16 patients with spastic paralysis from extirpation of the pronator quadratus muscle followed by intensive re-education of the biceps and supinator muscles. Mr. H. A. Brittain (Norwich) outlined the advantages of ischio-femoral extra-articular arthrodesis of the hip as opposed to ilio-femoral, especially in the late treatment of tuberculous disease. Mr. Norman Capener (Exeter), in a review of spondylolisthesis, discussed the importance of a proper appreciation of stresses and strains in orthopædic conditions. At all ages he advised conservative treatment of spondylolisthesis, except when increasing displacement was present in adolescence, and when pain persisted. In both these exceptions a posterior spinal fusion should be performed. He condemned the anterior transperitoneal fusion as unnecessary and dangerous. Mr. F. W. Holdsworth (Sheffield) emphasised that in dislocation of the carpal semilunar manipulative reduction of a recent injury could most easily be achieved by traction in palmar flexion since this position opened up most widely the space between the os magnum and the radius. In injuries neglected for longer than 14 days excision of the semilunar provided better results than operative replacement. Mr. V. H. Ellis (London) discussed the reaction of bone to the pressure of fluctuant tumours. He said it was generally agreed that osteoclasts are the only cause of bone absorption, which is the normal response of bone to continuous pressure, but there are differences between the results of pressure by hard and by fluctuant tumours—e.g., aneurysm, abscess, bursæ. In these, although absorption takes place, there is always a line of resistance formed by osteoblastic activity.

In the afternoon members of the association attended a clinical demonstration at the Royal National Orthopædic Hospital. At the dinner held the same evening the guests of honour were Sir William Macarthur, director-general of the Army Medical Services, and Colonel J. A. MacFarlane, of the Canadian Army Medical Service.

Naval Honour

The officers' decoration of the Royal Naval Volunteer Reserve has been awarded to Surgeon Commander E. E. D. Gray.

Massage Corps

In 1937 the Chartered Society of Massage and Medical Gymnastics decided to organise a massage corps, and an explanatory leaflet and enrolment form was sent to every member of the society. Some 6000 members have since enrolled in the mobile section for service at home or abroad, in the immobile section for service in their own town or city, or in a special section for those already attached to hospitals or units which will require their services in time of war. An organiser has been appointed to each of the Ministry of Health's regions for hospital services. Members have been graded according to their experience and qualifications, taking into account special experience in such subjects as plaster work and orthopædic work. Refresher courses have also been held. The Ministry of Health has accepted the corps as the enrolling body for massage personnel, and at the suggestion of the Ministry a supplementary list has been set up for the enrolment of qualified masseurs who are not members of the society.

CORRIGENDUM.—In the leading article on vitamins D_2 and D_3 in our issue of May 25 a sentence in the second paragraph on page 970 should read: "The value for vitamin D_2 is by definition 40,000 I.U. per milligramme . . ."

NOTES, COMMENTS AND ABSTRACTS

THE TRIANGULAR BANDAGE

FOR several reasons the art of bandaging has largely disappeared from the medical profession. The greater use of plasters has lessened the need for the firm, even pressure of a bandage, and the student now has little time for the intricate twists and turns that gladdened his predecessors. A few nurses can still bandage well, but the finer points of bandaging are now only appreciated by the amateurs in the first-aid organisations, and here a line of cleavage has developed. The medical and nursing professions use the roller bandage, the first-aiders the triangular. What are the reasons for this? Probably it is a question of supply, for good roller bandages are expensive. They are hard to wash, take a long time to dry, are difficult to re-roll and have seriously deteriorated when all this has been done. Triangular bandages may, in the first instance, cost more, but they are readily washable and dry rapidly, and can easily be ironed out and used again and again. But there is another difference between the two schools of thought. Students and junior pros may imagine they can put on a roller bandage by the light of nature; no-one can imagine this with the triangular. Each manœuvre has to be learnt by heart and continually rehearsed. This is exactly the sort of training needed for someone who is going to prepare much and practise seldom. It would therefore be inadvisable for the first-aid associations to change from the triangular bandage to the roller. Should every medical student be trained in its use before he qualifies? Most assuredly not. He already has to learn more than the human brain can bear, and few medical men and women take up the specialty of first-aid under ordinary circumstances. At the present time, however, that number is much increased, and many doctors who have never used a triangular bandage have got to learn its use in order to teach it to others. "Triangular Bandaging without Words" (John Bale, 1s.) will help; it is cheap, will go in the pocket, and does not spoon-feed because it consists of diagrams only, leaving the student to think out the details himself.

INFANT FEEDING

Dr. Lalit K. Mitra has packed into a small space a great deal of information concerning "Modern Technique in Infant Feeding" (Calcutta, 1939, pp. 133). If at times brevity makes him appear somewhat dogmatic he always shows plenty of good sense. He deals first with the management of breast-feeding, goes on to describe artificial feeding with fresh milk mixtures, analyses proprietary foods and discusses their particular uses and merits. Mixed feeding, feeding after weaning and the feeding of premature and ailing infants are also considered.

J. PATH. BACT.

THE May issue completes the 50th volume of our valued contemporary and even in this stern time a jubilee should not pass without a note of friendly recognition.

NEW PREPARATIONS

TUBERCLE ENDOTOXOID (B.D.H.) is a preparation of the tubercle bacillus from which the toxicity has been eliminated. It is issued by British Drug Houses Ltd. (London, N.1) in rubber-capped vials of 1 c.cm. and 3 c.cm. The results of clinical trials with it were reported in *Tubercle*, 1939, **20**, 397.

CARBACHOL (A. & H.) is carbaminoylcholine chloride, an ester of acetylcholine issued originally under the trade name Doryl. It exerts a therapeutic action similar to that of acetylcholine but more powerful and more prolonged. It is active when given by the mouth or by injection. Messrs. Allen & Hanburys have issued it in tablets containing 0·002 g. and in ampoules containing 0·000 25 g.

SULPHATHIAZOLE IN GONORRHŒA

GOOD results are reported by J. Gaté and P. Cuilleret (*J. Méd. Lyon*, May 20, 1940, p. 187) in the treatment of acute gonorrhœa in the male with sulphathiazole and with sulphamethylthiazole. Up to December, 1939, they had treated 68 patients with sulphathiazole. A total amount of 9 g. was given in doses spread over twenty-four hours, and a single day's treatment rapidly cleared the gonococci from the urethra without any local measures. All the patients were cured, as established by a careful follow-up, with provocative tests. Tolerance to sulphathiazole was very much better than to sulphapyridine. Cyanosis was seen in only one case. Sulphamethylthiazole was used in 41 cases; the drug was given by mouth in doses of 1 g. at intervals of two or three hours until 9 g. had been administered in twenty-four hours. After this course each patient rested for another twenty-four hours, and then provocative tests almost always showed a complete disappearance of gonococci from the urethra. All these patients were treated in hospital, so that proper supervision could be exercised. Scalding became less after eight hours' treatment—i.e., after 3 g. of sulphamethylthiazole had been absorbed—and usually disappeared finally after twelve hours' therapy. The urethral discharge began to be less purulent about the twelfth hour and clear towards the twentieth from the start of treatment. Tolerance to sulphamethylthiazole was excellent, and none of the known complications of sulphonamide therapy was observed.

Births, Marriages and Deaths

BIRTHS

ANDERSON.—On May 29, at Hove, the wife of Dr. J. M. Anderson—a daughter.

BICKERTON.—On June 1, at Gerrard's Cross, the wife of Wing Commander J. Myles Bickerton, F.R.C.S., R.A.F.V.R.—a daughter.

BODEN.—On May 31, the wife of Major Geoffrey Boden, R.A.M.C.—a daughter.

BREWER.—On May 28, at Luton, Elizabeth (née Nickell-Lean), the wife of Dr. H. F. Brewer—a son.

DEAN.—On May 27, in Edinburgh, the wife of Flight-Lieutenant W. J. Lyon Dean, M.B.—a daughter.

PARSONS-SMITH.—On May 27, in London, the wife of Dr. Gerald Parsons-Smith—a daughter.

MARRIAGES

BARTON—BARTON.—On May 28, at Kingston-on-Thames, James Kingston Barton, M.R.C.P., to Elizabeth Ellen Barton.

MUNDY—EDSALL.—On June 1, at Kensington, Norman Mundy, Surgeon Lieutenant, R.N.V.R., to Gwendoline Edsall, of Wimbledon.

RABAN—SCOTT.—On June 1, at Hatfield, John Pridmore Raban, Major R.A.M.C., of Harpenden, to Evelyn Margaret Scott, of Woodley, Berks.

WATSON—GILCHRIST.—On June 1, in Glasgow, George Ian Watson, M.D., to Caroline Murray Gilchrist.

YATES—DUPLOCK.—On June 1, at Dronfield, Arthur Gurney Yates, M.D., of Sheffield, to Doris Hope Duplock, of Dronfield.

DEATHS

CLOSE.—On May 29, at Wimbledon, Colonel Joseph Kinnear Close, M.D. R.U.I., Colonel I.M.S. (retd.).

HURTER.—On June 3, in Liverpool, Herbert Richard Hurter, M.D., hon. LL.D. Lpool.

LEECH.—On May 30, at Alnmouth, Northumberland, Sir Joseph William Leech, M.P., M.S. Durh., F.R.C.S.

O'SHAUGHNESSY.—In May, in Flanders, Laurence O'Shaughnessy, M.D. Durh., F.R.C.S., Major, R.A.M.C.

ROWE.—On May 28, at North Stifford, Essex, John Joseph Stephen Rowe, L.M.S.S.A., late of the Seamen's Hospital, Tilbury, aged 76.

STEWARD.—On May 31, at Kingswood, Francis James Steward, M.S. Lond., F.R.C.S.

VAN BUREN.—On May 29, at Plymouth, Asa Claude Alexis Van Buren, M.D. Lond.

WADE.—On May 30, in a London nursing-home, Rubens Wade, M.R.C.S., senior anæsthetist to St. Bartholomew's and the Royal Northern Hospitals.